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Service



# Biological Assessment

For Consultation with the U.S. Fish and Wildlife Service

## Taylor Park Vegetation Management

**Gunnison Ranger District, Grand Mesa, Uncompahgre and  
Gunnison National Forests  
Gunnison County, Colorado**

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## Introduction

The purpose of this Biological Assessment (BA) is to address the effect of the Taylor Park Vegetation Management Project on ESA-listed species, listed as endangered or threatened under the Endangered Species Act (ESA), or their designated critical habitat. The Grand Mesa, Uncompahgre and Gunnison (GMUG) National Forests, Gunnison Ranger District intends to authorize the project through an Environmental Assessment (EA) and Finding of No Significant Impact. The Environmental Assessment for the project is available online at: <https://www.fs.usda.gov/project/?project=53662>

The project involves actively and adaptively managing vegetation to improve forest health and resiliency in the Upper Taylor River and Spring Creek drainages. It has the potential to impact the following ESA-listed species that occur in the area: Canada lynx (*Lynx Canadensis*) and North American wolverine (*Gulo gulo luscus*).

This BA submitted by the Gunnison Ranger District conforms to legal requirements set forth under section 7 of the Endangered Species Act (ESA) (19 U.S.C. 1536 (c), 50 CFR 402.12 (f) and 402.14). Section 7(a) (1) of the ESA requires federal agencies to use their authorities to further the conservation of listed species. Section 7(a) (2) requires that federal agencies ensure any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of federally-listed species, or destroy or adversely modify designated critical habitat.

This document also includes types of information specific to analyzing projects under the Southern Rockies Lynx Management Direction (SRLA, USDA 2009). This helps ensure that the appropriate information is used in the effects analysis and provided to the U.S. Fish and Wildlife Service that leads to streamlined consultations on SRLA projects.

The purpose of the proposed action is to increase the forest's ability to respond to multiple and interactive stressors including climate change, drought, insect attack, or disease while promoting safety and reducing fuel loading in the Wildland-Urban Interface (WUI) and surrounding areas. The objectives are as follows:

1. Protect young healthy stands of lodgepole pine from infestation by dwarf mistletoe;
2. Remove dwarf mistletoe-infested stands;
3. Maintain tree growth rates in existing treatment areas through the use of pre-commercial thinning;
4. Produce lodgepole pine and Engelmann Spruce saw timber from suited timber in the watersheds;
5. Salvage of spruce bark beetle, mountain pine beetle and Douglas-fir bark beetle killed trees for commercial wood products;
6. Thinning of stands adjacent to private property to improve forest health and reduce fuels in WUI areas.

## Description of the Proposed Action

Proposed treatments preliminarily identified for suitable sites within the project area are listed in the following table and described in detail below. Ultimate acreage of each treatment is likely to change over

the course of the project. Treatments will be refined during implementation as additional inventory is completed.

**Table 1. Proposed treatments and estimated acres in the Taylor Park project.**

Treatment	Acres
Dwarf Mistletoe Edge Strip Cuts or Clearcut	3,566
Overstory Removal	733
Shelterwood Seed Cut (or Group Selection in Spruce or Clearcut if Mistletoe is Present)	714
Group Selection in Spruce	741
Prescription To Be Determined (see explanation below), Mixed-species	193
Young Stand – Pre-commercial Thinning, Sanitation, or No Immediate Treatment	6,182
Fuel Treatment	2,820
Total	14,949

### Dwarf Mistletoe Edge Strip Cuts and Dwarf Mistletoe Clearcut

Vegetation Type: Lodgepole pine dominated areas (present spruce and fir would be retained to enhance diversity).

This treatment prescription would be applied in lodgepole pine-dominated areas where dwarf mistletoe is present. In areas surrounding young lodgepole pine stands, infested edges will be harvested or felled within 100 to 300-feet of healthy, young trees. Where edges are healthy trees or trees other than lodgepole pine, harvest or treatment maybe deferred. Where former clearcuts left only a narrow strip of trees which are now vulnerable to windthrow, the entire strip would be removed. Several non-edge strip stand clearcuts are proposed in areas of high infestation. Mechanical site preparation may be used to promote seed germination and seedling survival.

Individual dwarf mistletoe clearcuts will not exceed the 40-acre limitation identified in the Forest Plan.

All lodgepole pine other than wildlife trees would be removed or felled. Live lodgepole pine wildlife trees would be girdled to create wildlife snag retention and reduce the spread of dwarf mistletoe. Other tree species may be left uncut if they are healthy and of low risk for windthrow.

The mechanical site preparation would reduce fuel loading on the site through piling and burning. Snags and downed logs will be retained on site as prescribed in the Forest Plan and by the District Biologist.

The desired condition would be areas naturally regenerating to lodgepole pine and other tree species with minimal dwarf mistletoe infestation.

If a stand is determined to be in good condition with healthy trees it may not need treatment.

### Overstory Removal

Vegetation Type: Predominately lodgepole pine, but spruce-fir stands are also proposed.

In most applications, the overstory removal is the final harvest of merchantable trees left from previous shelterwood preparatory and seed cutting. The stand is two-storied and two-aged, with an adequately stocked understory of healthy, young trees.

This harvest treatment will remove all mature overstory trees, which will allow the existing young trees to fully occupy the site, releasing an even-aged stand of trees growing in fully-open conditions.

Regeneration will be protected to the extent possible to ensure adequate stocking of undamaged trees after the completion of operations. Open areas may be treated to foster additional natural tree recruitment. Cull residual trees too small or too defective for commercial utilization may be felled to reduce competition with desirable young trees. Lodgepole pine with dwarf mistletoe would be harvested or felled to reduce disease presence and spread.

In some stands, spruce bark beetle has created mortality of the Engelmann spruce overstory. These stands would be a salvage commercial harvest which would remove the dead trees and allow the understory full access to sunlight.

If a stand identified for “Overstory Removal” is found to be heavily infested with dwarf mistletoe, then the prescription would be changed to that of “Dwarf Mistletoe Clearcut” as described above.

After Overstory Removal, the desired condition is a young, healthy, fully-stocked stand of trees which are free from competition from overtopping trees.

### **Shelterwood Seed Cut**

Vegetation Type: Lodgepole pine dominated areas

This treatment would remove 40-45 percent of the overstory trees uniformly, or in groups of ¼- acre to two-acre size, across the stand to promote regeneration by allowing sunlight and nutrients to reach the forest floor. This would allow seeds from the residual trees to regenerate. The neighboring residual trees would provide for partial shading of seed beds and protection of young trees from drying winds.

The prescription is either the first step in a two-step shelterwood, or the second step of a three- step shelterwood. In twenty years, the final overstory removal would be completed to release the then established understory of young trees.

The treatment will for the short-term, create a two-aged, two-storied stand. In the longer-term, a relatively even-aged, single-storied stand would be allowed to grow into the future.

If a stand is found to be dominated by Engelmann spruce, and if the overstory is not overmature and deteriorating, then the prescription may be changed to “Group Selection” as described below.

If a stand is found to be dominated by lodgepole pine, and that lodgepole pine is infested with dwarf mistletoe, then the prescription may be changed to “Dwarf Mistletoe Clearcut”.

### **Group Selection in Engelmann spruce-dominated Stands**

This treatment would harvest trees in groups to promote regeneration. Emphasis for group placement would focus on pockets of dead, diseased, damaged, or declining trees. About 25 percent of the stand area would be cut during this entry, with group size ranging from ¼-acre to two acres in size. Mechanical soil scarification, may be used to promote seed germination and seedling survival. A 40-year cutting cycle is normally prescribed in this part of the Forest.

Where spruce bark beetle is or has created spruce mortality, the prescription to be applied is salvage harvesting. The salvage may exceed two-acres in an area. Following salvage harvesting, treatments to promote natural tree regeneration or to prepare for artificial reforestation (tree planting) would be

implemented as dictated by site-specific conditions. Concentrations of heavy fuel loading may be piled and burned.

Lodgepole pine in these harvest units would be surveyed for dwarf mistletoe and treated to minimize disease presence and spread.

The desired condition of the group selection harvesting in the long-term is creation and maintenance of Engelmann spruce-dominated stands (and other tree species) with four age classes present, with trees of similar age concentrated in clumps or groups.

### **Prescription Undetermined, Mixed-species Present**

Several stands were identified in the proposed action development where commercial timber harvest would be feasible, but the current condition and tree species composition is not fully known. In these identified stands, the management prescription would be determined after on- the-ground survey is completed. Any of the prescriptions described above might be applied. For the purpose of this analysis a clearcut treatment was included.

### **Young Stand -- Precommercial Thinning, Sanitation, or No Treatment**

Vegetation Type: Lodgepole pine dominated areas (present spruce and fir would be retained to enhance diversity).

This treatment would leave dominant, healthy trees at a spacing of 8-12 feet between stems depending on the size of the tree. Tree species other than lodgepole pine would be retained unless their removal is necessary for safety or operational purposes. The intent of this treatment is to maintain desirable growth rates and promote tree vigor. A dwarf mistletoe survey will be completed during the thinning operation, and any diseased trees felled to reduce disease presence and spread.

Slash from the thinning operation would normally be lopped and scattered to lay within two-feet of the ground. Lop and scatter retains the nutrient capital of felled trees on site for future utilization by the desired trees. Where pre-commercial thinning is undertaken in the WUI, the thinning slash would be piled and burned to reduce fuel loadings.

Not all of the stands identified as “Young Stand – Pre-commercial Thin, Sanitation, or No Treatment” class will be thinned during the next ten years. Many stands are not yet ready for thinning. Thinning too early or too wide spacing can be counterproductive. Consideration of snowshoe hare/Canada lynx habitat needs may determine whether a thinning of a particular site occurs, or is modified to maintain/improve habitat conditions for the term.

The general desired condition after treatment is a young, healthy, even-aged stand of trees, with reduced competition between trees that are free to grow.

### **Fuel Treatment**

Vegetation Type: Predominately lodgepole pine, but the lower Taylor canyon the vegetation type will also contain areas of mixed conifer.

Fuel treatment would reduce stand density and break up canopy continuity to lower the probability of a crown fire. Larger trees would generally be favored for retention. Damaged, diseased, suppressed, and intermediate trees will be favored for removal. Open areas will be created to break-up stand continuity. Residual slash will be hand or machine piled and burned to reduce the intensity of a ground fire.

Visual quality of managed stands from neighboring areas is a consideration. Commercial harvest of merchantable trees may be used to remove wood from the area, and reduce the fuel loading in a cost effective way.

The desired condition would reduce fuel loading near private land, or other values, where wildfire suppression could be more effective and safe. As directed by the Healthy Forest Restoration Act (HFRA), the Forest Service has been giving increased attention to fuels management within the WUI. The area encompassed by the WUI is identified in a Community Wildfire Protection Plan. If there is no Community Wildfire Protection Plan in place, the WUI is identified as: 1) the area 0.5 miles from the boundary of an at-risk community; 2) within 1.5 miles of the boundary of an at-risk community if the terrain is steep or there is a nearby road or ridge top that could be incorporated into a fuel break or the land is in condition class 3; or 3) the area contains an emergency exit route that requires hazardous fuel reductions to provide safer evacuation from the at-risk community.

## Roads

Some temporary road construction would likely be needed. Temporary roads will be obliterated at the end of use or within 5-years of sale closure if roads are needed to complete post-harvest activities. Existing administrative use roads maybe reopened for operational use, then closed afterwards. Both temporary and administrative use roads would be closed to public motorized use. The intention is to maintain the open road and trail system as defined by the 2010 Gunnison Travel Management Plan Decision as displayed on the current Motor Vehicle Use Map for the Gunnison Ranger District. Weed treatment as identified in the Design Features (Appendix B) will be implemented during project activities and at the time of road closure to avoid and/or prevent infestation.

## Adaptive Implementation

The Taylor Park Vegetation Management Project will be using Adaptive Implementation similar to that which was developed for the Spruce Beetle Epidemic and Aspen Decline Management Response (SBEADMR) Project. The prescriptions and design features will depend upon on-the-ground conditions at the time of implementation. Lessons and information learned since implementation of SBEADMR will be incorporated into this project. The following tools will be used to determine actual treatments:

- Silvicultural Prescription Matrix – would be used to identify which and how various stands will be treated to achieve management objectives, see Appendix A. Detailed silvicultural prescriptions will be completed by a certified silviculturist by comparing current versus desired vegetative conditions.
- Design Features – would be applied to treatments to minimize or avoid undesirable impacts to resources including, but not limited to, vegetation, soils, water, wildlife and cultural resources. Design Features are incorporated into both action alternatives and their effects analyses. The appropriate design features would be applied when surveys or management activities indicate a need to do so. It is also assumed that design features will be implemented as designed and in a readily visibly effective way. Analysis completed in this document assumes implementation of the appropriate design features, see Appendix B.
- Pre-Treatment Checklist – tracking tool would document that all required surveys and compliance checks for an individual treatment have been completed. The checklist will also identify design features that would be applied to a particular treatment. For example, the presence of a Northern goshawk nest in a treatment area would trigger the avoidance/protective measures as specified in



the design features of the EA. As such, the checklist would assure treatments are implemented consistent with the EA. The checklist will also be used to confirm compliance with the Forest Plan.

- Annual Interdisciplinary and Management Review – a monitoring method that provides documentation that treatments are implemented as planned.

## Species and Critical Habitat Considered and Analyzed

The following list includes threatened, endangered, and proposed species, and/or designated critical habitat that are located on the GMUG National Forest, or are located adjacent to or downstream of the project and could potentially be affected. This list of species was obtained from U.S. Fish and Wildlife Service (IPaC site <https://ecos.fws.gov/ipac/>). A pre-field review will be conducted prior to projects being planned. Data generated from the surveys will be used to plan treatments both to benefit various wildlife species and to avoid or minimize potential impacts. The Treatment Design Checklist will be used to document that required surveys have been completed as well as identifying which design features will be applied to a specific treatment. Required monitoring and annual reporting to Fish and Wildlife Service is discussed in the monitoring section of this BA.

No further analysis is needed for species that are not known or suspected to occur in the project area, and for which no suitable habitat is present. Table 2 documents the rationale for excluding a species. If suitable but unoccupied habitat is present, then additional survey is needed, or presence can be assumed and potential effects evaluated.

**Table 2. Federal Threatened, Endangered or Proposed Species That May Occur in the Action Area.**

Common Name	Scientific Name	Status	Known/ Suspected to be Present	Suitable Habitat Present	Designated Critical Habitat Present	Status and Rationale <i>if Not Carried Forward for Analysis</i>
Canada lynx	<i>Lynx canadensis</i>	Threatened	Yes	Yes	No	Present
North American wolverine	<i>Gulo gulo luscus</i>	Proposed Threatened	No	Yes	No	Not known to occupy in the State of Colorado, however suitable habitat is present, brief analysis is below.
Gunnison sage-grouse	<i>Centrocercus minimus</i>	Threatened	No	No	No	No suitable sage-brush habitat is present in the project area
Mexican spotted owl	<i>Strix occidentalis lucida</i>	Threatened	No	No	No	No suitable canyon or dense mix-conifer habitat is present in the project area

Yellow-billed cuckoo	<i>Coccyzus americanus</i>	Threatened	No	No	No	No suitable old- growth riparian (cottonwood/willow) woodlands with dense understories is present in the project area.
Uncompahgre Fritillary Butterfly	<i>Boloria acrocynema</i>	Endangered	No	No	No	No suitable alpine habitat is present in project area.

## Consultation to Date

Clay Speas, Renewable Resource Staff Officer with the GMUG NF met with Kurt Broderdorp and Allison Jehly from FWS, Grand Junction Office on June 14, 2018 to discuss the Taylor project and the adaptive approach proposed.

## Species Evaluated in Detail

### North American wolverine

On October 18, 2016 (81 CFR 71670), the U.S. Fish and Wildlife Service reopened the comment period of the February 4, 2013 proposed rule to list the distinct population segment of wolverine occurring in the contiguous United States as threatened, under the Endangered Species Act of 1973 (Act), as amended. The District Court for the District of Montana vacated the August 13, 2014, withdrawal of the proposed rule to list the distinct population segment of the North American wolverine as threatened under the Act, which effectively returns the process to the stage of the proposed listing rule published in 2013. This initiates a new status review of the North American wolverine, to determine whether this distinct population segment meets the definition of an endangered or threatened species under the Act.

The wolverine is included in this analysis because proposed management activities involve suitable habitat that may be occupied. There once was a viable population of wolverine in the state, however the last confirmed record was from 1919. Twelve survey efforts from 1979-1996 yielded no confirmed sightings. Colorado's high elevation and rugged terrain are good wolverine habitat, but because the species naturally exists in extremely low numbers wherever it is found, the species was never numerous here. In 2009, researchers from Grand Teton National Park tracked a wolverine into north central Colorado. In addition, a wolverine was documented as a traffic-related mortality on Interstate 70 in 2012 within Region 3 of the Colorado Department of Transportation (CDOT 2012). It is estimated that Colorado has the potential to support approximately 100 animals at full carrying capacity.

Given that all potential habitat associated with the proposed action is currently unoccupied there will be no direct effect to the species. However, if the species is eventually reintroduced to or recolonizes Colorado, activities such as vegetation management and fuels reduction are not expected to have measureable influences on wolverine habitat because changes in vegetative characteristics has little affect to the species. According to the Fish and Wildlife Service the primary threat to the North American wolverine is from habitat and range loss due to climate warming. Wolverines inhabit habitats with near-arctic conditions wherever they occur. In the contiguous United States, wolverine habitat is restricted to high-elevation areas in the West. Other threats are minor in comparison to the driving primary threat of climate change; secondary threats include harvest, i.e., trapping; inadequate regulatory mechanisms to

protect against human recreational disturbance, infrastructure developments, and transportation corridors; and demographic stochasticity and loss of genetic diversity due to small effective population sizes.

## Canada lynx

The Canada lynx was listed as threatened by the U.S. Fish and Wildlife Service on March 24, 2000. Lynx are broadly distributed across most of Canada and Alaska, which combined encompass about 98% of the species breeding range. The contiguous U.S. distinct population segment (DPS) accounts for the other 2% and includes resident breeding populations in the boreal forests of northern Maine, northeastern Minnesota, northwestern Montana/northern Idaho, and north-central Washington. An introduced population also occurs in western Colorado, and several other areas may have historically supported small resident populations. Lynx also have occurred temporarily in many other states, typically during irruptions (mass dispersal events) from Canada when northern hare populations underwent dramatic cyclic declines roughly every 10 years.

By the late 1970's the Canada lynx was thought to be extirpated in Colorado. Because of Colorado's isolation to the nearest lynx populations in Montana and northern Wyoming, reintroduction seemed to be the only viable option to return lynx to Colorado. So in 1999, The Colorado Lynx Reintroduction Program, (CPW) was started. In a seven-year period, 218 lynx were introduced into Colorado.

Based on breeding surveys, monitoring results, and completion of the program's original goals, CPW declared the lynx reintroduction a success in 2010. Today, an estimated 150-250 Canada lynx are in Colorado. Lynx have been confirmed to be present on the GMUG National Forest by Colorado Parks and Wildlife researches. Researches used radio-telemetry to also confirm reproduction on the GMUG. In addition, the SRLA identifies all lynx habitat for the National Forests in the Southern Rocky Mountains as occupied.

## Management Direction for Canada Lynx

The Canada lynx was listed as threatened largely due to a lack of regulatory mechanisms on federal public lands, which is where a majority of the habitat for Canada lynx was believed to be located in the lower 48 states. Since receiving ESA protection, federal land managers throughout the lynx's range have formally amended their management plans and implemented conservation measures to conserve the species. In 2008, the Southern Rockies Lynx Management Direction Record of Decision on the SRLA was published, which integrated the Canada Lynx Conservation Assessment and Strategy (LCAS, Ruediger et al. 2000, Interagency Lynx Biology Team 2013) and Ecology and Conservation of Lynx in the United States Science Report (Ruggiero et al. 2000) into standards and guidelines and amended the Forest Plan (USDA 2008). The purpose and need for the amendment was to establish management direction that conserves and promotes the recovery of lynx, and reduces or eliminates potential adverse effects from land management activities and practices on National Forests in the southern Rocky Mountains, while preserving the overall multiple-use direction in existing Forest Plans. In May 2009, the Forest Service published an Implementation Guide for the SRLA (USDA 2009). The Implementation Guide provided the basis for much of the interpretation of the SRLA used in this analysis.

Most recently, in January of 2018 the U.S. Fish and Wildlife Service announced the availability of the Final Species Status Assessment (SSA, USDI 2017) Report for the Contiguous U.S. DPS of the Canada lynx. The SSA compiles the best available scientific information regarding the historical, current, and potential future conditions for lynx in the lower 48 states. It evaluates the DPS's viability considering climate change, forest management and related regulations, wildland fire management, and other potential sources of habitat loss and fragmentation. The report incorporates the formally-elicited opinions of recognized lynx experts from throughout the DPS range regarding the current and future status of,

potential threats to, and likely viability of resident lynx populations in the DPS. Although this document will be referenced in this analysis, current Forest Service direction applies and the analysis will meet the intent of the SRLA.

### Objectives, Standards and Guidelines Applicable to the Tayler Park Project

The following objectives, standards and guidelines are applicable to the Taylor Park Project:

- Objective ALL 01: Maintain or restore lynx habitat connectivity in and between Lynx Analysis Units (LAUs), and in linkage areas.
- Objective VEG 01: Manage vegetation to mimic or approximate natural succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx.
- Objective VEG 02: Provide a mosaic of habitat conditions through time that support dense horizontal cover, and high densities of snowshoe hare. Provide winter snowshoe hare habitat in both the stand initiation structural stage and in mature, multi-story conifer vegetation.
- Objective VEG 04: Focus vegetation management in areas that have potential to improve winter snowshoe hare habitat but presently have poorly developed understories that lack dense horizontal cover.
- Standard VEG S1: If more than 30% of the lynx habitat in an LAU is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects.
- Standard VEG S2: Timber management projects shall not regenerate more than 15% of lynx habitat on NFS lands within an LAU in a ten-year period. Salvage harvest within stands killed by insect epidemics does not add to the 15%, unless the harvest treatment changes the habitat to unsuitable.
- Standard VEG S5: Pre-commercial thinning may occur only: 1) within 200 feet of administrative sites, dwellings, outbuildings, etc.; 2) for research studies; 3) where aspen is in decline; 4) where based on peer reviewed and accepted information that the project is not likely to adversely affect lynx or that a project is likely to have short term adverse effects but would result in long-term benefits to lynx and its habitat; and 5) may occur where pre-commercial thinning does not exceed 1% of the lynx habitat in any LAU for the life of the amendment; and pre-commercial thinning in LAUs with more than 30% of the lynx habitat currently in the stand initiation structural stage is limited to areas that do not yet provide winter snowshoe hare habitat; and projects are designed to maintain lynx habitat connectivity and provide snow shoe hare habitat over the long term; and monitoring is used to determine snowshoe hare response.
- Standard VEG S6: Vegetation management projects that reduce winter snowshoe hare habitats in multi-story mature or late successional conifer forests may occur only: 1) within 200 feet of administrative sites, dwellings, outbuildings, etc.; 2) for research studies; 3) incidental removal during salvage harvest and 4) when uneven-aged management (resiliency – single tree and small group selection) are employed to maintain and encourage multi-story attributes as part of gap dynamics.

- Guideline VEG G1: Vegetation management projects should be planned to recruit a high density of conifers, hardwoods, and shrubs where such habitat is scarce or not available. Priority for treatment should be given to stem-exclusion, closed-canopy structural stage stands to enhance habitat conditions for lynx or their prey (e.g. mesic, monotypic lodgepole stands). Winter snowshoe hare habitat should be near denning habitat.
- Guideline VEG G4: Prescribed fire activities should not create permanent travel routes that facilitate snow compaction. Constructing permanent firebreaks on ridges or saddles should be avoided.
- Guideline VEG G5: Habitat for alternate prey species, primarily red squirrel, should be provided in each LAU.
- Guideline VEG G10: Fuel treatment projects within the WUI as defined by HFRA should be designed considering Standards VEG S1, S2, S5, and S6 to promote lynx conservation.
- Guideline VEG G11: Denning habitat should be distributed in each LAU in the form of pockets of large amounts of large woody debris, either down logs or root wads, or large piles of small wind thrown trees (“jack-strawed” piles). If denning habitat appears to be lacking in the LAU, then projects should be designed to retain some coarse woody debris, piles, or residual trees to provide denning habitat in the future.

## Environmental Baseline

### Canada Lynx

#### Forest Condition

The Gunnison Ranger District has approximately 285,000 acres of lodgepole pine-dominated forest with an additional 162,000 acres of lodgepole pine mixed with other dominant tree species. Extensive surveying estimates that 52 percent of those lodgepole forests, or approximately 232,000 acres, have some level of dwarf mistletoe infestation.

Dwarf mistletoe is a parasitic plant exclusively hosted by conifers primarily impacting trees by disrupting nutrient cycling that can strongly influence forest structure and dynamics. Lodgepole pine dwarf mistletoe (*Arceuthobium americanum*) is considered especially lethal. It spreads primarily through explosive ejection of its seeds from hydrostatic pressure in the fruits allowing a spread distance of 50 to 75 feet, although most seeds fall within 33 feet of the host tree or on other parts of the same tree. Dwarf mistletoe weakens host trees, making them more susceptible to mountain pine beetle and pine engraver mortality, increases risk of wildfire mortality, increases surface fuel loadings, and mistletoe brooms act as fuel ladders which can carry surface fire higher up into the tree canopy. Heavily infested stands lose approximately eight percent of their trees each decade. In stands that have been impacted for more than 80 years, up to 15 percent of the trees may die each decade.

Of the acres of proposed treatment in the Taylor Park Project, the primary goals for 11,598 acres is to reduce the amount of ladder fuels, by mechanical means, regenerate lodgepole pine stands to create a mosaic of age-classes across the landscape and reduce incidence of dwarf mistletoe. Although there are a few positive aspects of dwarf mistletoe on wildlife including:

- Shoots of the dwarf mistletoe plant, which may be used as a food source
- Witches' brooms, which may be used by some animals for nesting, denning, hiding, caching, or foraging.

There are considerably more negatives (Worrall 2018):

- Decrease in number and size of seeds produced by the host tree, which reduces food for animals that use the seeds for food.
- An increase in mortality of host trees, which may influence animals through a change in the dynamics or size of snags.
- Through growth inhibition and mortality of the host species, the vegetation type may gradually change, influencing animals in various ways.

Since the early 1960s, the GMUG has made progress on regenerating diseased lodgepole pine stands and ensuring that those regenerating stands are free of dwarf mistletoe, or "sanitized". In the Taylor Park EA analysis area, 6,363 acres of lodgepole pine has been previously regenerated and sanitized on suited lands. There is a need to expand upon that progress and continue to increase the size and extent of lodgepole pine forest that is relatively free of dwarf mistletoe infestations. The key tool for achieving the primary project purpose of sanitizing dwarf mistletoe infested tree stands is to identify then remove infected trees stands within 150 feet of healthy tree stands. The best tool for removing the infected trees is through commercial timber harvest. The desired outcome from proposed harvest activities is regenerated healthy stands of lodgepole pine free from dwarf mistletoe while reducing fuel loads concurrently.

Areas of spruce-fir and quaking aspen forest across the National Forest have been the focus of commercial and noncommercial mechanical treatments, prescribed fire and other treatments to restore ecosystem resiliency under the SBEADMR project since 2016. The Taylor Park project would complement the SBEADMR project by regenerating lodgepole pine to create a diversity of age classes, reducing incidence of mistletoe, improving spruce resiliency, and managing wildland/urban interface fuel loading in forest types outside of, but adjacent to, those addressed by SBEADMR.

### Lynx Habitat Details

Specific details of environmental baseline for lynx include current condition and trend of affected Geographic Areas (GA), Lynx Analysis Units (LAU) and Lynx Linkage Areas (LLA), assessment of snowshoe hare and red squirrel habitat, influence of roads, and existing snow compaction levels in affected LAU and LLA. Cumulative effects are assessed at the LAU scale.

Table 3 discloses baseline statistics for objectives, standards and guidelines from the SRLA. The SRLA established forest-wide caps and LAU caps that are tracked annually and reported to Fish and Wildlife Service. All caps are considered maximum acres of impact that can occur over the life of the Amendment.

**Table 3. Management direction and standards and associated habitat impact caps under VEG S1, S5 and S6, SRLA (USDA 2008).**

Management Objectives	Standard	Standard - Forest- wide or LAU acre limitation (2008)	Standard - Forest-wide or LAU acres remaining as of 2018. Data includes maximum acres affected from SBEADMR	Comments
<p>All Management Practices and Activities -</p> <p>Objective O1: Maintain or restore lynx habitat connectivity in and between LAUs and in linkage areas.</p> <p>Objective VEG 02 – Provide for a mosaic of habitat conditions through time to support dense horizontal cover, and high densities of snowshoe hare. Provide winter snowshoe habitat in both the stand initiation structural stage and in mature, multi-story conifer vegetation.</p> <p>Objective VEG 03 – Conduct fire use activities to restore ecological processes and maintain or improve</p>	<p>All S1 Standard– New or expanded permanent developments and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area.</p> <p>Influence of roads and Highways</p> <p>Seasonal Average Daily Traffic counts (SADT) range from a high 851 at Taylor Canyon Road near Spring Creek Road to a low of 113 at Cumberlin Pass Rd near Town of Tincup.</p>	None	None	Attainment occurs at the project-level through project layout and implementation of Design Features. There are no linkage areas included in the project area.
	<p>Standard VEG S1 – If more than 30 percent of the lynx habitat in an LAU is currently in the stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects</p>	LAU level standard – cannot exceed 30 percent of an LAU in an unsuitable condition.	<p>Acres remaining for affected LAU:</p> <p>Rocky Brook: 8,117</p> <p>Grizzly Peak: 4,948</p> <p>Fossil Ridge: 9,647</p> <p>Tincup: 10,182</p> <p>Upper Taylor: 8,379</p>	
	<p>Standard VEG S2 – Timber Management shall not regenerate more than 15 percent of lynx habitat on NFS lands within the LAU over a 10-year period.</p>	LAU level standard – cannot exceed 15 percent of an LAU in an unsuitable condition from management actions.	<p>Acres remaining for affected LAU:</p> <p>Rocky Brook: 8,117</p> <p>Grizzly Peak: 4,948</p>	

			Fossil Ridge: 9,647	
			Tincup: 10,182	
			Upper Taylor: 8,379	
	VEG S5 Standard – Pre-commercial thinning practices and similar activities intended to reduce seedling/sapling density are subject to within 200 feet of administrative sites, dwellings, or out- buildings or conifer removal in aspen where aspen is in decline.	Exemption-Pre-commercial thinning in WUI is limited to 3% of the total lynx habitat on the Forest. Total acres available = <b>42,424</b>	<b>42,293</b>	A total of <b>131</b> acres of WUI treatment has been completed or 0.3% of the total CAP.
		Exceptions 1-4 (VEG S5) and exceptions 1-3 (VEG S6) allow combined treatment up to 0.5% of the lynx habitat on the Forest. Total acres available = <b>7,071</b>	<b>2,978</b>	A total of <b>4,093</b> acres under exceptions 1-4 in VEG S5 and Exception 1-3 in VEG S6 is affected or 30% of the CAP.
	Standard VEG S6 – Vegetation management treatments that reduce snowshoe hare habitat in multi-story spruce-fir mature or late successional conifer forest may only occur: 1) within 200 feet of administrative sites, outbuildings, recreation sites, etc; 2) for research studies; 3) for incidental removal during salvage harvest; or 4) when uneven aged management (single tree or group selection) are employed to maintain or encourage multi-story attributes.			

### *Geographic Areas (GA)*

Geographic Area Assessments were completed on the GMUG in 2005 (USDA 2005). Assessments were completed for 5 Geographic Areas (GA) on the Forest – Uncompahgre Plateau, Grand Mesa, San Juan Mountains, North Fork and Gunnison Basin. These GAs provide a way of linking broad-scale forest assessment and project-level analysis. The GA describes current vegetation conditions, wildlife structural stages, Potential Natural Vegetation (PNV) and how the proposed actions influence these factors. The Taylor Park project is wholly within the Gunnison Basin GA. This assessments will be used throughout



this analysis to describe current vegetative conditions and target vegetation conditions (PNV) at the GA and LAU scales.

### *Lynx Analysis Units (LAU)*

Lynx Analysis Units (LAUs) are intended to facilitate analysis and monitoring of the effects of management actions on lynx habitat. Table 4 shows the existing condition of lynx habitat in the project area and the amount of Forest Service land (Table 5) within the LAU. Baseline began in 2008 when the SRLA was signed.

There have been resident lynx documented in Taylor Park, based on Theobald and Shenk (2011), lynx high use areas were documented in both Rocky Brook and Upper Taylor LAUs during the 1999 – 2010 time period.

Based on lynx location information and den site information (1999 – 2011, Dr. Jake Ivan, Wildlife Researcher, personal communication, 11/9/18), there are lynx locations in each of the LAUs listed below. Based on the raw location data and home range estimators used to analyze raw data, only Rocky Brook and Upper Taylor actually held resident lynx that had established home ranges. There are fewer locations from a variety of individuals in Fossil Ridge, and Tincup LAUs, which suggests that use of those LAUs was largely by animals moving through them, rather than residents.

Grizzly Peak LAU looks to have less use than Rocky Brook and Upper Taylor, but more than Fossil Ridge and Tincup. Also, there is a lot of resident lynx use just over the divide from Grizzly Peak LAU to the north, including a couple of den sites approximately 1 mile N of the Grizzly Peak LAU boundary.

There is one known den site each in Rocky Brook (2005) and Upper Taylor Park (2009), both from the same female.

**Table 4. Environmental Baseline Statistics of Lynx Habitat within the proposed affected environment.**

Lynx Habitat Description	Acres of Lynx Habitat (% of Total Lynx Habitat in LAU)				
	Rocky Brook	Grizzly Peak	Fossil Ridge	Tin Cup	Upper Taylor
Total Acres in LAU	63,228	35,969	55,251	66,591	53,197
Primary Suitable	35,621	13,949	25,718	29,682	20,613
Secondary Suitable	6,212	3,052	10,853	7,646	10,041
Primary Unsuitable	60	360	0	115	379
Secondary Unsuitable	0	<1	0	0	0
Total Lynx Habitat	41,833 (66%)	17,001 (47%)	36,571 (66%)	37,328 (56%)	30,654 (58%)
Combined Unsuitable	60	360	0	115	379

**Table 5. Lynx Habitat by Ownership**

Lynx Habitat Description	Rocky Brook		Grizzly Peak		Fossil Ridge		Tin Cup		Upper Taylor	
	FS	Non-FS	FS	Non-FS	FS	Non-FS	FS	Non-FS	FS	Non-FS

Primary Suitable	35,187	434	13,857	92	24,960	757	28,362	1,319	20,433	179
Secondary Suitable	6,073	138	2,738	322	10,046	806	6,839	807	9,958	82
Total Lynx Habitat	41,260	572	16,595	414	35,006	1,563	35,201	2,126	30,391	261
Primary Unsuitable	60	0	35	317	0	0	115	0	379	0
Secondary Unsuitable	0	0	0	0	0	0	0	0	0	0

### *Lynx Linkage Area (LLA)*

There is only one LLA in the project area, the Cottonwood/Tin Cup LLA which is 26,173 acres, of that 14,773 acres or 56% is lynx habitat. None of the treatments occur within the LLA.

### *Snowshoe Hare and Red Squirrel Habitat Conditions*

Acres of mature multi-story spruce-fir and late successional lodgepole pine stands were identified from FS Veg spatial for affected LAU (Table 6 and 7). Habitat structural condition 4A, 4B and 4C (mid-late and late-seral) with an understory provide habitat characteristics needed to support snowshoe hare. At the GA scale, the Gunnison Basin North supports 34% of mature multi-story stands with 28% of suitable lynx habitat.

Multi-storied and late successional stands have the greatest potential to support high quality habitat for hares. High quality hare habitat is defined as having a dense horizontal cover of greater than 35% (USDA 2008). Late seral multi-storied spruce-fir and lodgepole pine with dense horizontal structure provides the best overall habitat for hares (Squires et al. 2010, Berg et al. 2012). Berg (2010) also found hares to occupy sites with horizontal cover as low 20% in Wyoming. Multi-storied spruce-fir stands also provide suitable habitat for red squirrels (*Tamiasciurus hudsonicus*) and grouse (*Bonasa umbellus* and *Dendragapus obscurus*) which are also utilized by lynx as prey (Berg 2010).

Dense horizontal cover (DHC) surveys on the Gunnison Ranger District completed in the South Gunnison GA document 54% of the mature multi-story stands support high quality hare habitat. Based upon these past surveys it is estimated that 50% of the multi-story stands across all of the GA provide high quality habitat for hares. Acres of multi-story stands for each LAU are provided in Table 5. Of the 158,453 acres of suitable lynx habitat in the project area, 25% is of high quality spruce-fir and spruce fir/aspen and 8% is late successional lodgepole. During treatment planning DHC surveys will be completed and will be used to design treatments to avoid or minimize effects (Vasquez et al. 2013).

Red squirrels are a secondary but important food source for lynx and also utilize multi-story spruce stands as habitat. However recent mortality in the overstory of spruce stands has affected squirrels populations. Large beetle outbreaks destroy most spruce trees found within infested stands, leaving little chance for red squirrel population success. Not only does decreased spruce density threaten red squirrel success rates, but spruce trees are unpredictable when it comes to seed crop produced each year (Gurnell et al. 1984), which means that infested spruce stands may also yield low seed density, leaving little for the squirrels to forage upon. Field studies in central-Alaska found that areas experiencing high spruce beetle severity tended to result in low red squirrel densities, compared to regions experiencing lower levels of beetle severity (Matsuoka et al. 2001).

**Table 6. Acres of Mature Multi-story Spruce-Fir Lynx Habitat in Project Area.**

LAU	Acres of Suitable Lynx Habitat	Acres of Multi-story Mature Spruce Stands	Percent of Multi-story Lynx Habitat
Rocky Brook	41,260	12,330	30
Grizzly Peak	16,595	1,020	6
Fossil Ridge	35,006	12,204	35
Tin Cup	35,201	7,879	22
Upper Taylor	30,391	6,495	21

**Table 7. Acres of Late Successional Lodgepole Lynx Habitat in Project Area.**

LAU	Acres of Suitable Lynx Habitat	Acres of Late Successional Lodgepole Stands	Percent of Late Successional Lynx Habitat
Rocky Brook	41,260	4,813	12
Grizzly Peak	16,595	448	3
Fossil Ridge	35,006	2,797	8
Tin Cup	35,201	3,841	11
Upper Taylor	30,391	1,424	5

### *Roads*

Table 8 lists the number of acres by LAU and vegetation type of lynx habitat currently affected by roads. An average clearing width of 40 feet (20 feet each side of the road) was used and it is assumed all lynx habitat within this corridor have been permanently converted to stand initiation structure stage and included in the totals for VEG S1.

**Table 8. Acres of Lynx Habitat Affected by Existing Forest Service System Roads by LAU.**

LAU	Miles of Roads in LAU	Total Acres lynx habitat converted to unsuitable (existing)	Acres within Mature Multi-story Spruce-Fir	Acres within Late Successional Lodgepole
Rocky Brook	115	343	180	74
Grizzly Peak	30	55	6	32
Fossil Ridge	76	160	6	25
Tin Cup	110	314	67	84
Upper Taylor	98	187	61	29

### *Snow Compaction*

Packed trails created by snowmobiles, cross-country skiers, snowshoe hares, and other predators might serve as travel routes for potential competitors and predators of lynx, especially coyotes (Interagency Lynx Biology Team 2013). Morphological differences (ratio of body mass to foot area) between coyotes and lynx appear to spatially segregate these species by snow conditions with coyotes at a disadvantage in deep, soft snow due to their high foot-load. Acres of existing snow compaction in affected LAU are provided in Table 9. Acres of snow compaction include designated groomed trails and roads, plowed roads designed play areas and areas of concentrated snowmobile use.

**Table 9. Environmental Baseline for Snow Compaction by LAU.**

LAU	Snow Compaction Acres	Percent of LAU Compacted
Rocky Brook	30	<1
Grizzly Peak	4	<.01
Fossil Ridge	17.9	<.01
Tin Cup	97	<.01
Upper Taylor	51	<.01

### *Connectivity of Lynx Populations and Habitat*

Lynx are highly mobile and able to disperse long distances. Because of this mobility it is important to maintain connectivity between blocks of habitat. The SRLA requires maintaining habitat within and between LAU and linkage areas. LAUs were developed on the GMUG because they represent the home range of a single female lynx (25-50 square miles) and therefore is the most appropriate scale for project-level analysis (USDA 2008). Connectivity at the LAU-scale is best achieved by minimizing influences of highways that accommodate high volumes of traffic at high speeds and providing for a mosaic of habitat conditions across the landscape (USDA 2008 and Interagency Lynx Biology Team 2013). Mosaics of habitat conditions include dense early seral coniferous and mixed- coniferous-deciduous stands and mature multi-story stands. Habitat connectivity is defined as “cover vegetation” in sufficient quantity and arrangement to allow for the movement of lynx.

Narrow forested mountain ridges or shrub-steppe plateaus may serve as linkage between more extensive areas of lynx habitat; wooded riparian communities may provide cover across valley floors. Active management using fire and mechanical vegetation treatments to maintain a mosaic of lynx habitat, in varying successional stages, distributed across the LAU in a landscape pattern that is consistent with historical disturbance processes is a lynx conservation goal. Within the Taylor Park treatment-level design features will be implemented to help maintain connectivity.

For the purposes of Taylor Park project, connectivity at the LAU scale will be defined as movement toward PNV as described in comprehensive assessment for the GA (USDA 2005). The area where a given climax plant community can grow is classified as PNV type, and is named for the climax plant community.

For example, spruce-fir forests in the Gunnison Basin GA are the climax plant community at elevations from 10,000 to 12,000 feet, in the subalpine climatic zone (30-40 inches of precipitation annually, 50-70 frost free days, 30-40°F mean annual air temperature) (Johnston et al. 2001). The historic fire regime for the spruce-fir PNV type was long return interval (> 200 years), stand replacing fires, which could cover areas from 1,000 to 10,000 acres mixed with infrequent low-intensity surface fires that affected much smaller areas. Recent fires have been very infrequent and very small in this PNV type. Spruce beetle outbreaks have also occurred several times in the past century, affecting portions of this PNV type.

The PNV for the LAUs in the project area based on VDDT modeling<sup>1</sup> for Spruce-fir/Spruce-fir Aspen is in Table 10.

**Table 10. Succession (Seral Stages) in Spruce-fir and Spruce-fir Aspen PNV Types by LAU.**

	Early Seral	Early-Mid Seral	Late-Mid-Seral	Late Seral
Desired Condition (%)				
VDDT Model Spruce- fir PNV	27-32%	20-24%	12-40%	
VDDT Model Spruce- fir- aspen PNV	13-19%	22-29%	13-49%	
Existing Vegetation Condition (%)				
LAU			(Limited age data makes it difficult to differentiate between late-mid and late seral conditions.)	
Rocky Brook	0	38	62	
Grizzly Peak	<1	87	13	
Fossil Ridge	0	38	62	
Tin Cup	0	53	47	
Upper Taylor	<1	51	48	

Existing Condition was derived from FS Veg special data (GMUG\_FSVegSpatial\_JointData\_03262016) using predominately the "Cover Type" field as described below:

- Spruce-fir = TSF (spruce-fir) cover type
- Spruce-fir-aspen = TAA (aspen) cover type. However for this Spruce-fir-aspen the data was further filtered by DLF\_Species (dominate life form species) to only include aspen (PORT5) with some component of Englemann spruce (PIEN) and/or subalpine fir (ABLA).

The Gunnison RD has found that lodgepole pine in a PNV and VDDT modeling discussion is problematic because it commonly is in a fire "disclimax" scenario. In the natural system, fire would disturb the setting repeatedly over time. Being able to reach a utopian climax condition, which would likely be Engelmann spruce (*Abies lasiocarpa*), is highly unlikely in the repeated fire areas (i.e. lodgepole pine area). However higher elevation sites on cooler and more northerly aspects have a longer fire return interval and do make it to climax making the PNV model more appropriate (i.e. spruce-fir and spruce-fir-aspen areas). In Taylor Park there are large expanses of pure lodgepole pine which is in fire disclimax, where there is no seed source for spruce or fir to make a "seral shift" in dominant species (Art Haines, District Silviculturist, personal communication 08/24/2018 and 09/06/2018).

Most of the data presented in FS Veg spatial is derived from photo and aerial interpretation. Lodgepole pine physiologically has a narrower crown than most other tree species. As such, lodgepole pine tend to be under estimated on it habitat structural stage. Current FS Veg spatial data depicts a predominately

<sup>1</sup> Vegetation Dynamic Development Tool (VDDT) is applied to Potential Vegetation Types (PVT), PVT is defined by a cover type and structural stage and succession does not take into account outside impacts; VDDT is used to introduce natural or man-caused disturbances (i.e. fire, vegetation treatments), to more accurately predict the future successional stage.

early-mid seral state for all the LAUs lodgepole pine stands. However, the project area's lodgepole pine stands are predominately in the late-mid or late seral stages and not what is depicted in FS Veg spatial (Art Haines, District Silviculturist, personal communication 08/24/2018 and 09/06/2018).

## Affected Environment

### *Analysis Approach*

Analysis of the Taylor Park project to Canada lynx and their habitat is based on the framework and incidental take statement established by SRLA and supporting documents (USDA 2008) and the Biological Opinion (BO) issued by Fish and Wildlife Service (USDI 2008). Most of the impacts associated with the Taylor Park project were addressed by these documents and therefore is included by reference. Analysis completed under Taylor Park builds on this analysis by examining potential effects of completing commercial mechanical and non-commercial or prescribed burning at the LAU scale. The analysis also assesses the use of the silvicultural prescription matrix (Appendix A), design features (Appendix B) and LAU and Forest scale caps to minimize impacts to lynx and to ensure Taylor Park stays within the original incidental take statement issued by Fish and Wildlife Service in 2008. Tracking and reporting to FWS has been conducted annually to ensure cumulative impacts and SRLA management objectives are in-line with Forest Plan and BO requirements. Annual reporting will occur in February each year to FWS.

Annual reporting includes:

1. Status of VEG S1 in affected LAU. A trigger of 25% has been established to ensure no more than 30% of lynx habitat in an LAU will be converted to unsuitable. This includes both management caused and from natural disturbances (e.g wildfire).
2. Status of VEG S2 in affected LAU. A trigger of 10% has been established to ensure no more than 15% of lynx habitat in the LAU will be converted to unsuitable as a result of management actions.
3. Status of VEG S5 Forest-wide. Currently the Forest has a cap of 42,293 acres of pre-commercial thinning. In addition, no more than 1 percent of lynx habitat in an affected LAU will also be pre-commercially thinned.
4. Status of VEG S6 Forest-wide. Currently the Forest has 7,071 acre cap of high quality habitat that could be affected due to incidental loss from salvage, within 200 feet of dwellings. Sites, etc, or to complete uneven-aged management in spruce-fir.

## Direct and Indirect Effects

### Overview

This assessment notes that implementation of the proposed action would result in a reduction of stand initiation hare habitat. However, these effects would be short term and are within the allowable exemptions outlined in the Southern Rockies Lynx Management Direction. All proposed treatments comply with Southern Rocky Mountain Lynx Management Direction. Table 11 below gives an overview of suitable lynx habitat to be effected by each treatment type.

**Table 111. Acres Spruce-Fir and Spruce-Fir-Aspen (SF) and Lodgepole (L) by Proposed Action Treatment Types and LAU in Lynx Habitat on the Gunnison Basin GA.**

Treatment	Total Acres Treated	Rocky Brook		Grizzly Peak		Fossil Ridge		Tin Cup		Upper Taylor	
		SF	L	SF	L	SF	L	SF	L	SF	L
Dwarf Mistletoe Edge Strip Cuts or Clearcut*	3,566	0	131	0	177	0	2	0	348	0	369
Overstory Removal	733	28	93	0	0	0	0	7	29	9	33
Shelterwood Seed Cut (or Group Selection in Spruce or Clearcut if Mistletoe is Present)	714	128	318	0	<1	0	0	0	0	11	37
Group Selection in Spruce	741	558	0	0	0	0	0	0	0	117	34
Prescription To Be Determined, Mixed-species	193	0	<1	0	0	0	11	0	0	1	24
Young Stand -- Precommercial Thinning, Sanitation, or No Immediate Treatment**	6,182	194	27	<1	34	0	<1	10	94	67	103
Fuel Treatment	2,820	0	105	0	42	0	112	0	611	0	0
Total Suitable Habitat Treated by LAU (%)		980 (2)	572 (1.3)	4 (<.5)	249 (1.5)	0	125 (<.5)	18 (<.5)	1,071 (3)	334 (1.1)	471 (1.5)

*\*Data for Dwarf Mistletoe Edge Strip Cuts or Clearcut comes from the professional judgement, extensive experience, stand exams (1985-2018), and reforestation surveys (1985-2018) (Art Haines, District Silviculturist, personal communication 09/07/2018). This data is in conflict with FS Veg spatial data (which was used to generate the rest of the table). The FS Veg spatial data was derived from photo and aerial interpretation and not field verified.*

*\*\*The acres noted as SF are more accurately described as mixed spruce-fir and lodgepole. The spruce-fir in these treatments will be retained to enhance species diversity.*

The Taylor Park project is designed to be adaptive, the analysis was completed under current stand conditions against future adaptive stand conditions. The analysis assumes all stands would be managed and all roads proposed would be constructed. Of the 1,336 acres of suitable lynx spruce fir/spruce fir aspen habitat to be treated, 814 acres are group selection or shelterwood seed cuts, these treatments would be completed in accordance with the SRLA, and they are considered a conservation measure for lynx (USDA Forest Service 2008). Cuts typically cover only 20-40% of a given treatment unit. It is assumed that the remaining 522 acres would experience 25% incidental loss or 131 acres of suitable habitat converting to SISS.

In lodgepole the most acres treated are in fuel treatments which will reduce the understory and slightly reduce the overstory, mistletoe treatments (regeneration/clearcuts) are second most acres treated, this will greatly reduce the overstory and in the short-term the understory (see regeneration below). None of the treatments impact enough acres to reach PNV (Tables 10&11) in any of the LAUs but will continue to move towards the desired condition.

### Commercial Timber Harvest

Commercial timber harvest would reduce the spatial arrangement, amount, and density of vegetation that provides dense horizontal cover above six feet, or the average snow depth for snowshoe hare. Such practices would convert primary and secondary lynx habitat to a stand initiation stage. Additionally, timber harvest activities include removal of woody debris and have a salvage component, so there would



be less lynx denning habitat available (Ruediger et al. 2000). Lastly, overstory removal would reduce canopy cover, and lynx select areas of high canopy cover on a broad scale (Vanbianchi et al. 2017).

Treatments occurring in lynx habitat may reduce security cover and alter the preferred winter habitat of snowshoe hares. There may be a short term decline in snowshoe hares because of the increased likelihood of predation. Lynx may abandon cutting units because of the lack of security cover and reduction in prey availability, or instead select areas in cutting units that maintain cover, such as pockets of dense regeneration on a fine scale (Koehler and Brittell 1990, Vanbianchi et al. 2017).

Lynx in the southern Rockies are sensitive to changes in forest structure (Squires et al. 2013, Koehler 1990, Squires 2010). Because proposed treatments would reduce overstory and understory vegetation and remove down wood, snowshoe hare habitat and the quality of lynx denning and foraging habitat would be reduced over the short and long term (greater than 10 years) (Squires et al. 2013, Squires 2010). Thinning could also affect lynx movement across the landscape and can alter lynx distribution within their home range (Squires et al. 2006, Squires et al. 2010).

In the long term, there would be an increase in understory vegetation density due to clear-cuts, coppice cuts, patch cuts, and overstory removal (as openings in the overstory allow for pockets of regen to establish). This would increase winter cover available for snowshoe hares and thus increase prey availability for lynx. Additionally, once matured, seed-bearing lodgepole and spruce-fir would bring more seed-eating red squirrels and signal a return of security habitat.

Holbrook et al. 2018 found that Canada lynx clearly use silviculture treatments, but there is a temporal lag depending on the treatment types. More importantly the adjacent habitat to treatment sites had a stronger influence on post-treatment use. Within the Taylor Park project adjacent habitat to treatment sites vary considerably.

### Pre-commercial thinning

The amount and quality of snowshoe hare forage and escape cover would likely decrease as a result of pre-commercial thinning activities.

The amount and density of horizontal cover determine snowshoe hare abundance. Snowshoe hares avoid pre-commercially-thinned areas due to the decline in security cover (Ellsworth and Reynolds 2006 and Interagency Lynx Biology Team 2013). However, snowshoe hare may use the stands for forage if dense cover/refugia are nearby. With refugia, there may be a minimal reduction in snowshoe hare and as a result, a minimal effect to lynx (Ellsworth and Reynolds 2006).

### Regeneration Harvest

Regeneration harvest would result in conversion from any type of structural stage to early stand initiation. Regeneration harvest can also reduce potential denning habitat and red squirrel habitat by removing large trees and down logs on the site.

From SBEADMR monitoring post seedling density averaged 1228 trees per acre, mostly dominated by Engelmann spruce. In the roadside hazard treatments, where there is complete removal, the seedlings trees per acre averaged 105 trees per acre. Tree basal area was 8 to 10 ft<sup>2</sup>/acre and about 152 to 165 trees per acre (Mike Battaglia, PhD, personal communication, August 29, 2018).

## Salvage Harvest, Incidental Damage, and Landings

Trees that are damaged or dying due to insects and disease would be removed from the stand. Advanced regeneration would be left intact. There could be a reduction in coarse woody debris, current and future, and thus denning habitat for lynx in these units. Landing areas may result in the clearing of regenerating spruce-fir to accommodate landing areas.

With the implementation of project design features and Southern Rockies Lynx Amendment standards, incidental damage from temporary roads, landings, salvage harvest, and trees damaged/killed from felling other trees represent 15-20% of a reduction in the understory. This means there would be a reduction in winter forage and escape cover for snowshoe hare, but there would be dense pockets of advance regeneration left in place. Thus, there may be a decline in prey availability, and thus feeding success for the lynx. There would be a reduction in denning habitat in treatment units, however there would be some coarse woody debris retention. Existing coarse woody debris would be retained outside of treatment units.

Trees within stands that currently provide excellent horizontal cover at less than 6 feet from the forest floor would not be cut. Over the long term (10-40 years) a slight increase in the amount and speed of regeneration is expected due to the Proposed Action. This increase would improve snowshoe hare habitat over what is expected to occur under natural situations, and thus could mean there would be more prey available and an increase in feeding success for lynx.

Prior to the spruce beetle outbreak there was no difference in forest structure between unmanaged and managed forests however, the unmanaged stands had slightly lower seedling density. In SBEADMR, managed stands that have been salvaged maintain high seedling density and although there are fewer seedlings in unmanaged stands stocking guidelines are still met (Battaglia et al. 2017). And although there is high overstory mortality in unmanaged and managed stands, there is an abundant small diameter trees and regeneration, providing suitable lynx habitat in the understory.

## Roads

Fragmentation of lynx habitat can affect lynx by reducing their prey base and increasing the energetic costs of using habitat within their home ranges. Highways and roads typically follow natural features such as rivers, valleys, and mountain passes that are important to lynx as habitat or connectivity. Roads and in particular highways can be an impediment to lynx movement and source of direct mortality particularly on 4-lane highways with high traffic volume and speed.

Alexander et al. (2005) suggested traffic volumes between 3,000 and 5,000 vehicles per day may be the threshold above which successful crossings by carnivores are impeded. Since lynx reintroduction in Colorado, 13 lynx mortalities have occurred where vehicular traffic volume ranged from 2,300 to >25,000 vehicles per day (Interagency Lynx Biology Team 2013).

It is estimated that there will be 5,405 log truck loads generated by the proposed action. A maximum capacity of 50 loads can be hauled a day. Truck traffic associated with timber sale activities would increase traffic levels above existing conditions, by 100 per day. These loads would occur on different road segments depending on the location of the timber sale units, and would be dispersed throughout the planning area spatially and temporarily. When added to the existing baseline for traffic levels, all routes would stay well-below the 2,000 vehicles per day that is considered a potential impairment to lynx

Approximately 22 miles of temporary road in lynx habitat would be constructed then obliterated at project completion. 14 miles of existing roads closed to the public in lynx habitat would be used for hauling and

would be re-closed after project completion. An additional 55 miles of existing road in lynx habitat open to the public would be used for hauling.

Lynx generally do not appear to be impacted by forest roads with low vehicular traffic (Squires et al. 2010) and may actually use the road for travel (Koehler and Brittell 1990). However, because lynx appear to den farther away from roads than would be randomly expected (Squires et al. 2008), the temporary roads and use of closed roads may displace lynx from otherwise available denning habitat. Some researchers have noted that adult female lynx may move kittens to new den sites in order to avoid nearby vehicle traffic that escalates as summer comes on (Ruggiero et al. 1999). In some cases, lynx may alter normal travel and hunting patterns to avoid open roads, but they are also likely to travel along roadways less than 50 feet wide with good cover along both edges (Koehler and Brittell 1990). Field research and observation have shown that in normal circumstances lynx do not avoid habitat near roads except for those with high traffic volume (Aubry et al. 2000, Ruggiero et al. 1999).

Forest roads do provide greater human access, including to fur trappers who may incidentally trap a lynx when targeting other species. The likelihood of this occurring, however, is extremely low considering lynx presence is transient at best in the project area. Restricting temporary roads to project activities only would help offset the potential for incidental trapping and other activities that may disrupt lynx habitat use.

None of the temporary roads constructed for the project or the use of closed roads would yield high traffic volume since these roads would be closed to the public. Road speeds are already low since all Forest roads in the action area require speed limits of 35 mph.

### Linkage Habitat

As noted there is only one LLA in the project area, the Cottonwood/Tin Cup LLA, 14,773 acres (56%) of it is considered lynx habitat. No treatments are proposed within the LLA and therefore no effect would occur.

While the linkage area will not be affected, maintaining connectivity within and between harvest areas could be affected. Timber harvest and prescribed fire in the short term would remove conifers that may provide screening cover that facilitates travel. Regeneration harvest can alter lynx movement through a stand, although this varies seasonally and temporally (Squires et al. 2010 and Squires et al. 2013). Lynx will move across extensive non-forested areas as needed during dispersal or other long-range excursions (Koehler and Aubry 1994, Ruediger et al. 2000, Aubry et al. 2000), although they prefer to travel through forested habitats or along forest edges (Squires et al. 2013, Ruediger et al. 2000, Mowat et al. 1999).

Areas of high human use can also interrupt habitat connectivity and further fragment lynx habitat (Ruediger et al. 2000). The construction of temporary roads and the use of closed roads for hauling can have some influence on the ability of lynx to disperse through the area or move about freely within their home range. Road construction may reduce lynx habitat by removing forest cover and winter road use may provide access for lynx competitors. Conversely lynx have been documented using less traveled roads where the adjacent vegetation provides good hare habitat and Squires et al. (2010) concluded that forest roads with low vehicular or over-snow vehicle traffic had little effect on lynx seasonal resource-selection patterns in Montana. While preliminary information suggests lynx do not avoid roads, potential impacts are reduced when access, traffic volume, and road speed are reduced. Access would be kept to the minimum required to accomplish project activities by closing all temporary roads to the public. Traffic volume would be high in active logging and burning units although this use would be locally concentrated (e.g. logging activities would be confined to a single drainage at a time).

Connectivity across larger landscapes would not be compromised by this project since most of the action area would not be affected by the project and the units are mostly outside of suitable habitat; although, lynx may have to temporarily adjust movement patterns during project implementation. Harvest and burning treatments juxtaposed with untreated area would result in patterns of habitat that are desirable to lynx – i.e. early successional habitats that provide year-round snowshoe hare habitat interspersed with older multistory stands (Squires et al. 2010).

Schwartz et al. (2002) conclude that lynx throughout western North America are closely related indicating populations have been well enough connected to maintain close kinship. The proposed action would not compromise the ability of lynx to remain connected.

### Noise impacts from timber harvest practices

Noise impacts from cutting, hauling, and snowmobile use could impact lynx by causing lynx to avoid the action area. Lynx are primarily active at night, and since the majority of logging activities would occur during the day, this is expected to be a minor effect and a short-term impact. Moreover, lynx are likely to avoid the area because of short-term noise or commotion by proposed vegetation management operations. Lynx would likely return after the associated noises are abated.

### Adaptive Implementation

The Taylor Park project as noted is to have adaptive implementation allowing management to change on any given acre as needed and described in the silvicultural prescription matrix (Appendix A). This analysis considers the complete removal of habitat due to stand mortality. However, as has been monitored and seen in the implementation of SBEADMR, treatments in dead stands may reduce hare habitat, design features protects the understory. In addition these treatments are limited by the Forest Plan and not more than 40 acres can be cleared.

## Conclusions

Based on this analysis, the Taylor project **may affect, but is not likely to adversely affect** Canada lynx. The rationale for this conclusion is based on:

- Planned treatments in the proposed action affect 3,824 acres of suitable lynx habitat (2.4% of suitable habitat in the project area).
- Dense horizontal cover in the understory will continue to exceed 20-22%.
- Of the suitable lynx habitat that could be treated a maximum of 131 acres will be converted to SISS.
- Of the 6,182 acres of pre-commercial thinning, GIS identified 271 acres of it as spruce-fir habitat in LAUs (Table 11 above), however under the description of the proposed action above, pre-commercial thinning will occur in lodge-pole stands and spruce-fir will be maintained.
- The percent of early stand initiation habitat in any of the LAUs that touch the action area do not exceed 30%, even under the adapted implementation scenario.
- The project area is in the Cottonwood/Tincup LLA which has been identified as a linkage area in the SRLA. The project maintains the general forested nature of the action area as well as

landscape connectivity permitting broader lynx movements. No treatments are proposed in the LLA.

- Connectivity across larger landscapes would not be compromised by this project since 97% of the lynx habitat would remain untreated in the action area although the lynx may have to temporarily adjust movement patterns during project implementation.
- Prescribed fire would only be applied in timber harvest units and would not create permanent travel routes because these harvest units are expected to regenerate into forested condition. No permanent firebreaks on ridges or saddles would be built as a part of this project.
- Of the approximately 200 acres identified for fuel treatments, some acres meet WUI fuels exemptions.
- Red squirrels are common small mammals who use a variety of habitats. Although conifer seeds are their primary food source, red squirrels are true omnivores. Red squirrel habitat is found throughout the project area.
- Overall, the project is designed protect young healthy stands of lodgepole pine from infestation by dwarf mistletoe in the area, promote desirable regeneration, and improve forest resiliency. These goals are compatible with conservation of lynx habitat. The proposed action has been designed with SRLA Standards and Guidelines in mind. Field validation will be done prior to implementation.
- Denning habitat is not lacking in the project area. There is an abundance of down logs and the Design Feature WFRP-2 - snag retention would maintain denning habitat in the project area.

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## Appendix A - Silvicultural Prescription Matrix

### Taylor Park Vegetation Management EA Silvicultural Prescription Matrix

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## Decision Tree for Silvicultural Prescription Application

Stand is Engelmann spruce, lodgepole pine, or Douglas-fir, with bark beetle activity and tree mortality present.

### **Salvage Clearcut**

Stand is near private land in the Wildland Urban Interface.

Lodgepole pine stand has a Dwarf Mistletoe Rating of three or greater.

### **Dwarf Mistletoe Clearcut**

Stand has bark beetle activity and tree mortality is present (all tree species).

### **Salvage Clearcut**

Stand has a Dwarf Mistletoe Rating of two or less.

### **Fuel Treatment (Thinning)**

Stand is dominated by Engelmann spruce and subalpine fir; lodgepole pine is either not present or a minor component.

Overstory is mature and overmature with areas of reduced vigor, health, or elevated mortality.

### **Group Selection**

Overstory is healthy and in good condition.

### **Group Selection or Defer Treatment**

Overstory is immature, with a high stand density, trees are of a size suitable for posts, poles, and small diameter sawlogs.

### **Commercial Thinning**

Stand is immature, dense, with crown bases elevated above average snow depth, Dense Horizontal Cover is less than 35%.

### **Precommercial Thinning**

Stand is dominated by lodgepole pine with other tree species either not present or a minor component.

Stand has a Dwarf Mistletoe Rating of three or greater.

### **Dwarf Mistletoe Clearcut**

Stand is mature to overmature, Dwarf Mistletoe Rating is two or less, with little advanced regeneration is found in the understory.

### **Shelterwood Seed Cut**

Stand is mature to overmature, Dwarf Mistletoe Rating is two or less, with a minimum of 600 healthy seedlings or saplings per acre present in the understory.

**Overstory Removal**

Stand is immature to mature, dwarf mistletoe is not present, stand is healthy, stand density is not excessive.

**Defer Treatment**

Overstory is immature, with a high stand density, trees are of a size suitable for posts, poles, and small diameter sawlogs, and Dwarf Mistletoe Rating is two or less.

**Commercial Thinning**

Stand is immature, dense, with crowns self-pruning and crown bases elevated with Dwarf Mistletoe Rating of two or less. Site is "Dry" lodgepole pine or Dense Horizontal Cover is less than 35%.

**Precommercial Thinning**

**Salvage Clearcut**

*Use this prescription in stands where more than 40 percent of the basal area is dead (all tree species).*

**Planned Silvicultural System:** Even-aged or Uneven-aged

**Harvest Method:** Clearcut Initially

**Objectives:**

1. Generate and maintain multiple stories in the longer term
2. Shift species composition toward drought-resistant, shade-intolerant species
3. Regenerate a fully stocked stand in the open areas after harvest

**Desired Future Condition:**

The desired future condition is a healthy forest consisting of a mosaic of even-aged, two-aged, and uneven-aged stands as appropriate to the site-specific conditions and species composition. For stands previously dominated by Engelmann spruce or Douglas-fir, the desired future condition is a healthy, uneven-aged stand with an irregularly-balanced diameter distribution. At regulation, the stand will consist of four age-classes, with each cohort of trees concentrated in even-aged groups. Tree density in each even-aged group will be managed to control competition, maintain growth rates, and maintain health as appropriate for the age, species composition, and specific site conditions. Preference is the stand will be regenerated to Engelmann spruce or Douglas-fir as appropriate to the specific site, with other tree species accepted.

For stands previously dominated by lodgepole pine, regenerate the stand to lodgepole pine with a light component of other tree species becoming established in the distant future. Mortality rates should be less than 1% (of stems) per decade. Dwarf mistletoe ratings should be kept at DMR = 0 if possible, and DMR = 1 at most. Stand densities should be maintained in the SDI = 200 to 300 range in order to maintain acceptable growth rates and stand health. For these even-aged lodgepole pine stands, a rotation length of 140 years will be used. The target stand condition at CMAI is a fully-stocked sawtimber stand averaging 14-inches DBH with sufficient volume per

acre to justify multiple shelterwood entries, and density of 120 to 150 square feet of basal area. Use shelterwood regeneration methods at the end of rotation if dwarf mistletoe levels remain low.

**Silviculture Prescription:**

Remove all merchantable live and dead conifer, except those required to meet wildlife snag requirements. Retain between 200 to 300 wildlife trees per 100-acres of all condition classes. Protect existing conifer regeneration within the stand. Obtain additional regeneration in open areas.

Sanitize the stand of any dwarf mistletoe infestation by felling infested trees and those potential infested neighboring trees.

Follow-up salvage harvest with reforestation activities to ensure the recruitment of a fresh cohort of Engelmann spruce, Douglas-fir and lodgepole pine to replace bark beetle mortality.

Pile and burn excessive concentrations of slash and woody debris.

**Fuel Treatment (Thinning)**

*Use this prescription in stands adjacent to private property where the Dwarf Mistletoe Rating is two or less. If the DMR is greater than or equal to three, use the "Dwarf Mistletoe Clearcut" prescription.*

**Objectives:**

1. Reduce potential for crown fire by reducing or breaking up canopy continuity
2. Decrease potential surface fire intensity via reduced surface fuels
3. Improve tree health and vigor by reducing competition

**Desired Future Condition:**

The desired future condition is a healthy forest consisting of a mosaic of even-aged, two-aged, and uneven-aged stands as appropriate to the site-specific conditions. The stands will be dominated by lodgepole pine with a component of other tree species becoming established in the distant future. Mortality rates should be less than 1% (of stems) per decade. Dwarf mistletoe ratings should be kept at DMR = 0 if possible, and DMR = 1 at most.

**Silviculture Prescription:**

Retain between 30 and 80 square feet of basal area across the stand wherever practical with trees either being spaced uniformly or in small clumps. Retaining trees in clumps provides for mutual windthrow protection and gives correspondingly wider canopy gaps. Trees may be removed in groups of one-quarter (0.25) acre to two-acres in size as necessary. Larger openings and clearing strips maybe created to further break-up stand continuity. Favor removal of trees that are mature, over mature, suppressed, high-risk, low-vigor, diseased, or have defective stems. Remove dwarf mistletoe infested lodgepole pine, particularly those trees with multiple "witches brooms" which form fuel ladders.

Slash and existing concentrations of down woody debris is to be piled, then burned during appropriate weather conditions.

Treatments may be by commercial harvest, by non-commercial hand felling/piling, or by mechanical treatment (dozer machine piling or mastication).

### **Dwarf Mistletoe Clearcut**

*Use this prescription in stands with an average Dwarf Mistletoe Rating (DMR) greater than or equal to three.*

**Planned Silvicultural System:** Even-aged

**Harvest Method:** Stand Clearcut

**Objectives:**

1. Create forest age class and species diversity across the landscape
2. Protect forests from disease (dwarf mistletoe)
3. Prevent dwarf mistletoe spread to adjacent stands
4. Regenerate a fully stocked stand after harvest

**Desired Future Condition:**

The desired future condition is a healthy forest consisting of a mosaic of even-aged, two-aged, and uneven-aged stands as appropriate to the site-specific conditions. The stands will be dominated by lodgepole pine with a light component of other tree species becoming established in the distant future. Mortality rates should be less than 1% (of stems) per decade. Dwarf mistletoe ratings should be kept at DMR = 0 if possible, and DMR = 1 at most. Stand densities should be maintained in the SDI = 200 to 300 range in order to maintain acceptable growth rates and stand health. For these even-aged lodgepole pine stands, a rotation length of 140 years will be used. The target stand condition at CMAI is a fully-stocked sawtimber stand averaging 14-inches DBH with sufficient volume per acre to justify multiple shelterwood entries, and density of 120 to 150 square feet of basal area. Use shelterwood regeneration methods at the end of rotation if dwarf mistletoe levels remain low.

**Silviculture Prescription:**

Remove all merchantable live and dead lodgepole pine and dead Engelmann spruce. Retain live trees of species other than lodgepole pine, and between 200 to 300 wildlife trees per 100-acres of all condition classes.

After harvest, fell or girdle ALL remaining lodgepole pine within the units, of all sizes. Fell or girdle painted boundary trees.

Follow-up harvest and sanitation with machine scarification to prepare seedbeds for natural seedling recruitment.

Pile and burn excessive concentrations of slash and woody debris.

### **Overstory Removal**

*Use this prescription in lodgepole pine stands in stands that have previously been treated with a shelterwood prescription where a minimum of 600 conifer seedlings or saplings are present in the understory, and Dwarf Mistletoe Rating is two or less.*

**Planned Silvicultural System:** Even-aged

**Harvest Method:** Two-step Shelterwood or Simulated Shelterwood**Objectives:**

1. Create forest age class and species diversity across the landscape
2. Reduce competition between the desired young stand component and the residual mature overstory.
3. Obtain additional regeneration in understocked areas for a fully stocked stand after harvest.

**Desired Future Condition:**

The desired future condition is a healthy forest consisting of a mosaic of even-aged, two-aged, and uneven-aged stands as appropriate to the site-specific conditions. The stands will be dominated by lodgepole pine with a light component of other tree species becoming established in the distant future. Mortality rates should be less than 1% (of stems) per decade. Dwarf mistletoe ratings should be kept at DMR = 0 if possible, and DMR = 1 at most. Stand densities should be maintained in the SDI = 200 to 300 range in order to maintain acceptable growth rates and stand health. For these even-aged lodgepole pine stands, a rotation length of 140 years will be used. The target stand condition at CMAI is a fully-stocked sawtimber stand averaging 14-inches DBH with sufficient volume per acre to justify multiple shelterwood entries, and density of 120 to 150 square feet of basal area. Use shelterwood regeneration methods at the end of rotation if dwarf mistletoe levels remain low.

**Silviculture Prescription:**

Remove all merchantable lodgepole pine. Retain all other species. Retain between 200 to 300 wildlife trees per 100-acres of all condition classes. Protect existing conifer regeneration within the stand.

Sanitize the young trees of dwarf mistletoe by felling infested trees and those potential infested neighboring trees.

Obtain additional regeneration in open areas, including machine scarification of seedbeds where a seed source is present.

**Shelterwood Seed Cut**

*Use this prescription in mature to overmature lodgepole pine stands that have a dwarf mistletoe rating of two or less.*

**Planned Silvicultural System:** Even-aged**Harvest Method:** Two-step Shelterwood**Objectives:**

1. Create forest age class and species diversity across the landscape
2. Reduce understory competition and promote understory growth
3. Regenerate a fully stocked stand after harvest

**Desired Future Condition:**

The desired future condition is a healthy forest consisting of a mosaic of even-aged, two-aged, and uneven-aged stands as appropriate to the site-specific conditions. The stands will be dominated by lodgepole pine with a very light component of other tree species becoming

established in the distant future. Mortality rates should be less than 1% (of stems) per decade. Dwarf mistletoe ratings should be kept at DMR = 0 if possible, and DMR = 1 at most. Stand densities should be maintained in the SDI = 200 to 300 range in order to maintain acceptable growth rates and stand health. For these even-aged lodgepole pine stands, a rotation length of 140 years will be used. The target stand condition at CMAI is a fully-stocked sawtimber stand averaging 14-inches DBH with sufficient volume per acre to justify multiple shelterwood entries, and density of 120 to 150 square feet of basal area. Use shelterwood regeneration methods at the end of rotation if dwarf mistletoe levels remain low.

**Silviculture Prescription:**

Retain an average of 60 to 80 square feet of basal area uniformly across the stand wherever practical. Trees may also be removed in clumps of one-quarter (0.25) acre to two-acres in size as necessary. Favor removal of trees that are mature, over mature, suppressed, high-risk, low-vigor, diseased, or have defective stems.

Where open areas exist, follow-up with a light machine scarification to prepare seedbeds for natural seedling recruitment.

Sanitize the stand of any dwarf mistletoe infestation by felling infested trees and those potential infested neighboring trees.

**Group Selection**

*Use this prescription in Engelmann spruce dominated stands where less than 40 percent of the basal area is dead.*

**Planned Silvicultural System:** Uneven-aged

**Harvest Method:** Group Selection

**Objectives:**

1. Generate and maintain multiple stories
2. Maintain shade-tolerant species
3. Regenerate a fully stocked stand in the open areas after harvest

**Desired Future Condition:**

The desired future condition is a healthy, uneven-aged stand with an irregularly-balanced diameter distribution. At regulation, the stand will consist of four age-classes, with each cohort of trees concentrated in even-aged groups. Tree density in each even-aged group will be managed to control competition, maintain growth rates, and maintain health as appropriate for the age, species composition, and specific site conditions.

**Silviculture Prescription:**

Remove all merchantable conifer in groups of ¼-acre to two-acre in size, harvesting approximately 15-25 percent of the stand area. Smaller groups will be implemented on southeast to west aspects while larger groups may be placed on north facing aspects. Use smaller group size on slopes exposed to strong prevailing winds to minimize the potential for windthrow. Emphasize group placement in pockets of diseased, dead or dying trees wherever possible.

Individual tree salvage/sanitation will be conducted as needed to remove beetle affected trees in the matrix between cut groups. Maintain wind firmness by removing no more than 40 percent of the basal area within the matrix. Trees with active beetle life forms in the tree will be prioritized for removal.

A 40-year cutting cycle will be followed.

Follow-up harvest with machine scarification of open areas to prepare the seedbed for natural seedling recruitment.

**Commercial Thinning**

*Use this prescription in immature single-storied stands where the Dwarf Mistletoe Rating is two or less. Stands are typically 70 to 120 years age. Crown bases have become well elevated from self-pruning. Treatment described is for lodgepole pine, but maybe applied to single-storied Engelmann spruce as well.*

**Planned Silvicultural System:** Even-aged or Uneven-aged

**Harvest Method:** Commercial Thinning

**Objectives:**

1. Create forest age class and species diversity across the landscape
2. Reduce competition between trees and promote growth
3. Eliminate any dwarf mistletoe that is present

**Desired Future Condition:**

The desired future condition is a healthy forest consisting of a mosaic of even-aged, two-aged, and uneven-aged stands as appropriate to the site-specific conditions. The stands will be dominated by lodgepole pine with a light component of other tree species becoming established in the distant future. Mortality rates should be less than 1% (of stems) per decade. Dwarf mistletoe ratings should be kept at DMR = 0 if possible, and DMR = 1 at most. Stand densities should be maintained in the SDI = 200 to 300 range in order to maintain acceptable growth rates and stand health. For these even-aged lodgepole pine stands, a rotation length of 140 years will be used. The target stand condition at CMAI is a fully-stocked sawtimber stand averaging 14-inches DBH with sufficient volume per acre to justify multiple shelterwood entries, and density of 120 to 150 square feet of basal area. Use shelterwood regeneration methods at the end of rotation if dwarf mistletoe levels remain low.

**Silviculture Prescription:**

Leave an average of 100 (80-120) square feet of basal area of the best, most windfirm trees available. Emphasis is on salvage and sanitation of the stand. Favor removal of trees that are low-vigor, suppressed, diseased, or have defective stems. Thin from below where



salvage/sanitation needs are not paramount. Favor the development of seed trees. Favor the retention of tree species other than lodgepole pine when other species are present.

Where Engelmann spruce and subalpine fir dominate the site, the spruce/fir seedlings and saplings under six feet tall should be left to provide cover for wildlife since these individual trees do not represent much competition with taller saplings, pole-size and sawtimber-size trees.

Thinning slash is to be lopped and scattered to a depth of not more than 24 inches. Some small piles of slash may be created to act as habitat for small animals.

If dwarf mistletoe is encountered, all infested lodgepole pine or trees suspected of being infested will be either felled or girdled.

### **Young Stand: Pre-commercial Thinning or Sanitation**

*Use this prescription in immature single-storied stands with closed canopies denoting increased inter-stem competition and reduced growth rates, where the Dwarf Mistletoe Rating is two or less, the site is "Dry" lodgepole pine, or Dense Horizontal Cover is less than 35%. Crown bases are elevated from self-pruning. Treatment described is for lodgepole pine, but maybe applied to single-storied Engelmann spruce as well. Typically in lodgepole pine the stand would be 30 to 50 years age, and have greater than 2,000 trees per acre. In Engelmann spruce, the stand would be 40 to 80 years age, and have greater than 2,000 trees per acre.*

**Planned Silvicultural System:** Even-aged or Uneven-aged

**Harvest Method:** Pre-commercial Thinning and Dwarf Mistletoe Sanitation

**Objectives:**

1. Control stocking and species composition of the stand through pre-commercial thinning
2. Control the spread of disease (dwarf mistletoe)

**Desired Future Condition:**

The desired future condition is a healthy forest consisting of a mosaic of even-aged, two-aged, and uneven-aged stands as appropriate to the site-specific conditions. The stands will be dominated by lodgepole pine with a light component of other tree species becoming established in the distant future. Mortality rates should be less than 1% (of stems) per decade. Dwarf mistletoe ratings should be kept at DMR = 0 if possible, and DMR = 1 at most. Stand densities should be maintained in the SDI = 200 to 300 range in order to maintain acceptable growth rates and stand health. For these even-aged lodgepole pine stands, a rotation length of 140 years will be used. The target stand condition at CMAI is a fully-stocked sawtimber stand averaging 14-inches DBH with sufficient volume per acre to justify multiple shelterwood entries, and density of 120 to 150 square feet of basal area. Use shelterwood regeneration methods at the end of rotation if dwarf mistletoe levels remain low.

**Silviculture Prescription:**

Precommercial thin from below with tree spacing controlled more by crown spacing than a mechanical measurement. Provide one to four feet of space between crowns without trees overtopping or overlapping others. Crown spacing is intended to minimize the "lateral bushing out" or "wolf-tree" development, and to minimize getting a renewed flush of regeneration. In

general, average stand density will be about 436 trees per acre, or 10-foot spacing. Generally non-lodgepole pine tree species will be retained in the thinning.

Where Engelmann spruce and subalpine fir dominate the site, the spruce/fir seedlings and saplings under six feet tall should be left to provide cover for wildlife since these individual trees do not represent much competition with taller saplings, pole-size and sawtimber-size trees.

Thinning slash is to be lopped and scattered to a depth of not more than 24 inches. Some small piles of slash may be created to act as habitat for small animals.

If dwarf mistletoe is encountered, all infested lodgepole pine or trees suspected of being infested will be either felled or girdled.

Monitoring plots installed prior to pre-commercial thinning will be re-measured after thinning for stand density and dense horizontal cover (DHC).

### **Prescription Undetermined, Mixed-species Present**

Several stands were identified in the proposed action development where commercial timber harvest would be feasible, but the current condition and tree species composition is not fully known. In these identified stands, the management prescription would be determined after on-the-ground survey is completed. Any of the prescriptions described maybe applied as appropriate to the site-specific conditions.

# Appendix B - Design Features

## Taylor Park EA Design Features

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Identifier	Design Feature	Source / Citation
<b><u>Air Quality</u></b> Objectives: Comply with Clean Air Act requirements.		
AQ-1	All prescribed burning operations will comply with the State of Colorado air quality regulations.	Clean Air Act
(TSHR-7)	Use suitable road surface stabilization practices and dust abatement supplements on roads with high or heavy traffic use (See FSH 7709.56 and FSH 7709.59).	FS National BMPs
<b><u>Cultural Resources</u></b> Objectives: The following Cultural Resources Design Features derived from the Programmatic Agreement will be implemented for Alternatives 2 and 3. If these standard treatments are followed as described, the proposed treatment will have no direct or indirect effects on cultural resources. Furthermore, under the S.106 Notification consultation with the Colorado State Historic Preservation Officer, SBEADMR will have no adverse effect on historic properties (Claeysens 2014).		
CR-1	Cultural resource surveys will occur prior to treatment implementation. All sites within a treatment area will be avoided until State Historic Preservation Office consultation may be completed. Archaeologist will consult with timber personnel with regards to site locations	USDA Forest Service, 2015. - Programmatic Agreement for Bark Beetle, Hazardous Fuel and Tree Reduction Programs with Amendments
CR-2	Discoveries: If any new cultural resource sites are discovered during implementation, treatment activities would stop and the Forest Service archeologist would be contacted immediately. The archaeologist will evaluate the significance of the cultural resource. If potentially significant, within 48 hours of the discovery, the SHPO will be notified of the discovery and consultation will begin to determine an appropriate mitigation measure. The discovery will be protected from further disturbance until any required mitigation is completed. Operations may resume at the discovery site upon receipt of written instructions and authorization by agency officials.	USDA Forest Service, 2015. - Programmatic Agreement for Bark Beetle, Hazardous Fuel and Tree Reduction Programs with Amendments
CR-3	For all cultural resource sites located during the field inventory or previously known, no mechanical treatment or ground disturbing activities will occur within the site boundary, including an additional 50 foot buffer around the site. If mechanical treatments are necessary, the site and the 50 foot buffer around the site will be treated by hand to remove hazard trees and accumulated fuel build up.	Stipulation 5.B.b. ii and Stipulation 6.a and 6.b, Standard Treatments for Historic Properties, in the 2015 Programmatic Agreement for Bark Beetle, Hazardous Fuel and Tree Reduction Programs
CR-4	In areas slated for prescribed fire (broadcast or piles) treatment, flammable cultural resource sites or sites with components or features susceptible to heat damage with the APE will be marked on the ground by an archeologist, along with a buffer area of no less than 50 feet, sufficient to prevent fire or heat from affecting components of the site that may contribute to its eligibility to the National Register of Historic Places. In addition, treatments may include fuel-breaks, no-treatment buffers, wrapping, foaming, wetting, blackline, fire line (hand or mechanical), and clearing the cultural resource sites of flammable debris by raking and hand removal. Any fire line that will be ground disturbing will be subjected to an intensive field inventory; if any additional sites, components or features are located, the fire line will be adjusted to avoid these cultural resources.	USDA Forest Service, 2015
CR-5	If road construction cannot physically be relocated to avoid a site, and there is the potential for unidentified buried cultural remains, then SHPO consultation will take place and construction activities in the site boundaries would be monitored by an archaeologist.	USDA Forest Service, 2015
CR-6	Culturally Scarred Trees (CSTs) will be protected during mechanical treatments and to the extent possible, during underburns. Hand removal of fuels under CSTs will be conducted to the extent possible to reduce the risk of killing them during prescribed	USDA Forest Service, 2015

Identifier	Design Feature	Source / Citation
	burning. However, no measures will be taken to create firelines or physically prevent burning around the CSTs.	
CR-7	Post-Treatment Monitoring: For treatments where field inventories are not feasible due to visibility concerns prior to treatment implementation, monitoring in the form of a sample inventory for cultural resources will be required post implementation. This monitoring will take place within one year of treatment implementation, with results provided to SHPO.	USDA Forest Service, 2015
CR-8	Post-Treatment Monitoring: Cultural resource sites that were required to be avoided during treatment implementation will be monitored for effectiveness of the protection measures following treatment completion.	USDA Forest Service, 2015
CR-9	Native American human remains: Any operator carrying out treatments must notify the Forest Service, by telephone, with written confirmation, immediately upon the discovery of human remains or funerary items, discovered on federal land. The Forest Service must then immediately notify appropriate tribes of the find. All treatment activities must stop in the vicinity of the discovery that could adversely affect it, until tribal consultation can be completed and a Plan of Action can be approved and implemented	NAGRPA regulation 43 CFR 10.4(g)
Identifier	Design Feature	Source / Citation
<b><u>Forest Service Sensitive Plants</u></b> <b>Objectives:</b> 1. For Upland (non-wetland) Sensitive Species: Minimize impacts to individuals or populations that would lead to a loss in viability. 2. For all Sensitive Species: Minimize impacts to individuals or populations that would contribute to a loss in viability. 3. For Fen Sensitive Species*: a. Reduce potential for treatment-related resource damage to fens. b. Maintain fen hydrologic function (soil compaction, water diversion, dewatering) that would reduce suitability or sustainability of rare fen habitat. c. Prevent sedimentation events that would reduce or impair wetland functions. 4. For <i>Astragalus leptaleus</i> : Maintain functions of riparian wet or moist meadows. * <i>Carex diandra</i> , <i>Drosera rotundifolia</i> , <i>E. chamissonis</i> , <i>E. gracile</i> , <i>Kobresia simpliciuscula</i> , <i>Salix candida</i> , <i>Sphagnum angustifolium</i> , <i>Utricularia minor</i>		
FSSP-2	<b>All Sensitive Species</b> A - During prescribed fire operations (including aerial or ground broadcast burning), ignitions and other fuel treatment activities would be located away from sensitive plant species occurrences and wetlands. B - Dust abatement (use of $MgCl_2$ or $CaCl_2$ ) will avoid sensitive species occurrences and wetlands by 500 feet. C - Avoid sensitive species occurrences and wetlands with chemical weed treatments. E - Any Region 2 sensitive plant species new to list or located after contract or permit issuance will be appropriately managed by active coordination between permittee, contractor or purchaser, Contracting Officer, and Forest Service line officer, treatment administrator, and botanist. F - Surveys will occur prior to implementation; Botanist will communicate with timber staff the location of any sensitive species found	Elliott and others 2011, treatment- specific design
FSSP-3	<b><i>Machaeranthera coloradoensis</i></b> A - Minimize use of roads passing through known sensitive species sites.	Elliott and others 2011, treatment- specific design
FSSP-4	<b><i>B. paradoxum</i></b> B - If there is tree canopy covering habitat, maintain pre-treatment tree canopy over habitat.	Elliott and others 2011, treatment- specific design
FSSP-6	<b>Fen sensitive species*</b> A - Keep roads and trails out of wetlands and their water influence zones (WIZ). (1)B - Restore existing disturbed areas that are	(1) USDA Forest Service 2006. (2) USDA Forest Service 2006, 2012.

Identifier	Design Feature	Source / Citation
	eroding and contributing sediment to the wetland. (WQSP-2) – No mechanical equipment will be used within 100 feet of the edge of a fen.	
FSSP-7	<b>Fen sensitive species*</b> A – Treatment activities will avoid wetlands (see WQSP-6A) B – Mechanical treatment and vehicle use will occur outside of wetlands or their water influence zones. C- Prevent mineral sediment deposition from occurring in wetlands. (3)	(3) USDA Forest Service 2012, Austin 2008.
FSSP-8	<b>Fen sensitive species*</b> A - Develop an erosion and sediment control plan to avoid or minimize downstream impacts using measures appropriate to the site and the proposed activity. (3) B - Conduct prescribed fires (broadcast and piles) to minimize the residence time on the soil while meeting the burn objectives. This is usually done when the soil and duff are moist. C - Limit roads and other disturbed sites to the minimum feasible number, width, and total length. Minimize sediment discharge into streams, lakes, & wetlands during construction and stabilize & maintain disturbed sites to control erosion. (1) D - Maintain sufficient upslope ground cover to prevent sediment movement downward into wetland.	1) USDA Forest Service 2006. (3) USDA Forest Service 2012, Austin 2008.
FSSP-9	<b><i>Astragalus leptaleus</i></b> A - Avoid treatment activities and equipment use in wet or moist meadows. B - Design stream crossings at armored points, or armor them to prevent loss of functions in wet or moist meadows.	Elliott and others 2011, treatment- specific design
FSSP-10	<b>Upland (non-wetland) sensitive species</b> A- Sensitive plant populations will be flagged and avoided for all ground disturbing activities with a buffer of 20 – 100 feet (as determined during treatment surveys). B- Proposed road construction, reconstruction, landings and staging areas in potential habitat for sensitive species will be designed and marked on the ground only after the areas have been surveyed by a qualified botanist in the proper season.	Professional judgment
Identifier	Design Feature	Source / Citation
<b><u>Invasive Weeds</u></b>		
<b>Objective:</b> Prevent new introductions of invasive exotic plants (Invasive Weeds) or spread of existing infestations.		
IW-1	A - Consider excluding areas from prescribed burning (broadcast and piles) where there are infestations of fire-proliferating species (example, cheatgrass).	
IW-2	<b>Practices</b> - Prevent the accidental spread of invasive species carried by contaminated vehicles, equipment, personnel, or materials. (2) A - Establish and implement standards and requirements for vehicle and equipment cleaning to prevent the accidental spread of aquatic and terrestrial invasive species on the treatment area. (1) Use standard timber sale contract provision BT 6.35 to ensure appropriate equipment cleaning. Equipment cleaning should be conducted after working in areas with known infestations, and prior to bringing equipment onto the National Forest. B - Locate and use weed- free treatment staging areas. Avoid or minimize all types of travel through weed- infested areas. (3) C - All imported materials (erosion control materials, soil, gravel, etc.) should be from a “weed-free” source or area.(3) D - Monitoring will occur where imported materials have been placed to ensure no new infestations have been established.	(1) Noxious weeds, that appear on the State of Colorado’s noxious weed list (Colorado 2013) (2) FSM 2900. (3) USDA Forest Service 2001.

Identifier	Design Feature	Source / Citation
IW-3	<p><b>Practices</b> - Retain native vegetation to the extent possible to prevent weed germination and establishment, in and around activity area and keep soil disturbance to a minimum. (3)</p> <p>A – Contracts will require timber purchasers and contractors will re-seed disturbed areas (as designated by the Forest Service) with an appropriate certified weed-free native seed mix to avoid introduction of nonnative invasive plants and promote re-vegetation of native species.</p> <p>B - Throughout the implementation period of the proposed action, the Forest Service should maintain flexibility to defer cut units or stands within priority areas from treatment due to the discovery of significant new invasive plant populations with potential to disrupt the functioning of native plant communities.</p> <p>C - Where fuel reduction, timber harvest and other resource objectives necessitate ground disturbance and soil exposure, or substantial ground cover and canopy removal, include appropriate re-vegetation or invasive plant management strategies in treatment plan. (4) Where necessary, rehabilitate/restore or treat disturbed areas after management activities and conduct follow up monitoring on these areas susceptible to invasive plant spread. (4)</p> <p>D – In areas of high risk for invasive weeds spread, rehabilitate/restore or treat disturbed areas after fuel management activities and conduct follow up monitoring to minimize invasive plant spread. (4)</p> <p>E - Cover and reduce exposure of bare ground. Use on-site chipping or treated fuels from mastication to cover bare soil to prevent seed establishment where appropriate. (4) See SV-4 concerning areas where mineral soil exposure would be needed to assist with natural regeneration.</p> <p>F- Slash and burn piles will be located away from known invasive weed populations and will be assessed for restoration and revegetation needs.</p>	<p>(3) USDA Forest Service 2001.</p> <p>(4) Cal-IPC Land Management BMPs. 2012</p>
IW-4	<p><b>Practices</b> - Control and treat existing infestations to prevent treatment-associated spread and proliferation.</p> <p>A - Coordinate treatment activities with any nearby herbicide application to maximize cost effectiveness of nonnative invasive plant treatments. (3)</p> <p>B - Treatment of invasive weeds will follow Forest Service policy regarding certification of applicators and reporting of data to Forest Service data bases.</p> <p>C - Treatments of invasive weeds will follow the District Noxious Weed Treatment Decision Notice.</p> <p>D - Populations of noxious weeds should be aggressively treated with the appropriate management tools. This may include treatment with herbicides, grazing, cultural, and biological methods, consistent with the GMUG district decision notices.</p>	<p>(3) USDA Forest Service 2001.</p>
IW-5	<p>Within high risk areas for invasive weed species, complete inventories to identify invasive weed populations. Treat and document at least 50% efficacy rate prior to treatment and/or road-building.</p>	<p>USDA Forest Service, Region 2. 2015.</p>
IW-6	<p>Practices - Monitor project area for new infestations and to assess efficacy of treatments.</p> <p>A - Inspect and document all limited term ground-disturbing operations in infested areas for at least three growing seasons following completion of the project. For on-going projects, continue to monitor until reasonable certainty is obtained that no new infestations have occurred. Provide for follow-up treatments based on inspection results.</p> <p>B - Consider modifying design feature implementation for future project implementation based on considerations such as efficacy, cost, and other unforeseen impacts.</p> <p>C - Consider including other best practices for treatment-specific considerations.</p>	<p>Invasive Plant Data: The Rocky Mountain Region's Approach to Mapping and Recording Inventory and Treatment Data. October 2015.</p>

Identifier	Design Feature	Source / Citation
<b><u>Lands</u></b> <b>Objectives:</b> <ol style="list-style-type: none"> <li>1. Avoid impacts to existing infrastructure from treatment activities.</li> <li>2. Ensure treatments near electric infrastructure are conducted safely.</li> </ol>		
L-1	Mechanical treatments used to remove dead and dying vegetation shall utilize equipment or operating techniques to ensure that debris cannot be thrown into electrical facilities causing damage or safety hazards.	Professional judgment
L-3	When conducting hand treatments near energized facilities, non-electrical workers will observe the minimum approach distance.	Occupational Safety and Health Administration regulations provided in 29 CFR §1910.333.
L-4	Public Land Survey System corner preservation should be performed before any active or land disturbing management activity. This would include all known survey monuments, section corners, and other corner accessories.	Reference FSM 7150 and Timber Sales Contract Division BT BT6.23
<b><u>Range</u></b> <b>Objectives:</b> <ol style="list-style-type: none"> <li>1. Eliminate conflicts between implementation activities and range activities, or mitigate for them.</li> <li>2. Revegetate sites disturbed during implementation.</li> </ol>		
RG-1	Coordinate with District Rangeland Management Specialists prior to developing sale and/or service contracts and/or burn plans to identify and mitigate any potential direct conflicts during implementation. Range personnel will be responsible for incorporating mitigation measures into grazing permittees' Annual Operating Instructions (for example, a pasture needs to be grazed earlier/later to avoid direct temporal overlap with timber sale activities).	GMUG Forest Plan
RG-2	Coordinate with District Rangeland Management Specialists prior to treatment to determine whether or not grazing deferment or pasture rest is needed, when deferment or rest is needed (prior to or following treatment), and for how long.	USDA FS. Rocky Mountain Region. 1996.
(IW-5)	Re-seeding: See IW-5.	
Identifier	Design Feature	Source / Citation
<b><u>Recreation</u></b> <b>Objectives:</b> <ol style="list-style-type: none"> <li>1. Coordinate potential conflicts between timing of treatment implementation and recreation use.</li> <li>2. Seek opportunities to design treatments to benefit recreation residences, lodges, and organization camps in the vicinity of planned treatments.</li> </ol>		
REC-1	Avoid use of broadcast burning treatments in campgrounds (if piles are burned, ensure that impacts to residual trees are negligible).	Professional judgment, standard operating procedure



Identifier	Design Feature	Source / Citation
REC-2	Developed recreation sites: Managed by concessionaire: plans need to consider impact to summer operating season and should minimize impacts to operations as much as possible. For Forest Service operated sites: coordinate with District to address any District concerns regarding impact to the operating season.	Professional judgment, standard operating procedure
REC-3	Coordinate with District recreation staff regarding any treatment-related closures for developed recreation sites, dispersed recreation sites, trails and roads.	Professional judgment, standard operating procedure
REC-4	Special Uses: Work with recreation residences, lodges and organization camps to design treatments adjacent to these tracts to also treat these tracts to the extent feasible.  Coordinate with District recreation staff to address treatment-related impacts to special use permit holders in the treatment area.	Professional judgment, standard operating procedure
REC – 5	For treatments in ski areas, coordinate with the permit administrator for these areas to define the vegetation management in the ski areas.	Professional judgment, standard operating procedure
REC – 6	For all treatments, coordinate with District recreation staff to address treatment-related impacts to special use permit holders in the treatment area.	Professional judgment, standard operating procedure
REC – 7	For all treatments, for treatments within ¼ mile of Wilderness or Recreation Management Area boundaries, ensure that boundaries are clearly marked by cadastral grade survey or set treatment boundaries at least 300 feet from boundaries located with resource grade GPS using standard parameters for assurance of accuracy. Treatments must not enter wilderness.	Professional judgment, standard operating procedure
REC-8	For treatments that occur in winter or impact winter recreation access or use routes, coordinate with District recreation staff to address treatment-related impacts to winter uses, many of which are managed in partnership with clubs or other organizations.	Professional judgment, standard operating procedure
REC-9	When timber harvest activities preclude use of a nearby trail: a) notify the public; b) consider identifying timeframes for safe travel on the trail; and c) if harvest is expected to preclude use for more than one season and a detour is feasible, provide a detour.  For the CDNST, actions that allow continued use of the trail (or a detour) should be given higher consideration due to the national prominence of the trail.	Professional judgment, standard operating procedure

Identifier	Design Feature	Source / Citation
<b><u>Scenic Quality and Visual Resources</u></b>		
<b>Objectives:</b>		
<b>VQOs of Preservation (P)</b> – only ecological changes are allowed. Management activities, except for very low visual-impact recreation facilities, are prohibited. This objective applies to Wilderness areas, primitive areas, other special classified areas, areas awaiting classification and some unique management units which do not justify special classification.		
<b>VQOs of Retention (R)</b> – management activities must not be visually evident. They may only repeat form, line, color and texture which are frequently found in the characteristic landscape. Changes in their qualities of size, amount, intensity, direction, pattern, etc., should not be evident. Immediate reductions of contrast should be accomplished by means such as seeding vegetative clearing and cut-and-fill slopes, hand planting of large stock, painting structures, etc.		
<b>VQOs of Partial Retention (PR)</b> – management activities must remain visually subordinate to the characteristic landscape. Activities may repeat form, line, color or texture common to the characteristic landscape. Changes in their qualities of size, amount, intensity, direction, pattern, etc., remain visually subordinate to the characteristic landscape. Actions may also introduce form, line, color, or texture which are found infrequently or not at all in the characteristic landscape, but should remain subordinate to the visual strength of the characteristic landscape. Reduction of contrast in form, line, color and texture to meet partial retention should be accomplished as soon as possible or within a year minimum.		
<b>VQOs of Modification (M)</b> – management activities may visually dominate the original characteristic landscape. However, activities of vegetative and landform alteration must borrow from naturally established form, line, color or texture so completely and at such a scale that its visual characteristics are those of natural occurrences within the surrounding area or character type. Activities are predominantly introduction of facilities such as buildings, signs, roads, etc. Reduction of contrast (or compliance with regional guidelines) should be accomplished in the first year.		
<b>VQOs of Maximum Modification (MM)</b> – management activities may dominate the original characteristic landscape. However, when viewed as a background, the visual characteristics must be those of natural occurrences within the surrounding area or characteristic type. When viewed as foreground or middle ground, they may not appear to completely borrow from naturally established form, line, color or texture. Alterations may also be out of scale or contain details incongruent with natural occurrences as seen in the foreground or middle ground. Activities are typically additional part of structures, roads, slash and root wads must be subordinate to proposed composition as viewed in the background. Reduction of contrast should be accomplished within five years.		
Volume Two, Chapter 1: The Visual Management System, National Forest Landscape Management, Handbook 462, (Big Eye Book) pp 29 -- 37, .pdf, 4.08 MB		
SVR-1	<p>For all treatments, if VQO maps are not locatable, the following VQO's will be used as interpreted from the 1991 LRMP. These will be applied to the Visual Management Guideline Classes identified in the Visual Resource Management Section discussed below. These requirements apply to vegetation treatments.</p> <p style="text-align: right;">1A – Retention 1B - Modification, but Retain where possible 1D – Modification or Max. Modification 2A – Retention 2B – Partial Retention 3A - Retention 4B – Modification 4D – Modification 5A – Modification 5B – Modification 6A – Modification 6B – Modification</p>	LRMP.

Identifier	Design Feature	Source / Citation
	<p>7A – Modification or Max. Modification 10E – Modification</p> <p>Other Management Areas are not planned for treatment.</p> <p>See other requirements for Sensitivity Level 1 Roads, Trails and View Points below. Those requirements are more restrictive than the general management area requirements shown here.</p>	
SVR-2	<p>In all treatment areas, follow General Direction and associated standards and guidelines in the Visual Resource Management Section of the 1991 Land and Resource Management plan. This direction is found on pages III-12 through III-15.</p> <p>Consult with the forest visual resource specialist when implementing projects to ensure that these standards are being met. The visual resource specialist will adapt this direction to the situations where the forest has been heavily impacted with dead or dying trees. The visual system was not designed for these situation, however the principles are to be applied.</p>	LRMP.
SVR-3	<p>In developed recreation sites, including trailheads and administrative sites (typically Visual Quality Objectives [VQOs] of Modification or Maximum Modification), cut stumps as low to the ground as feasible.</p> <p>Remove or chip slash at developed campgrounds or designated recreation areas, extending outwards 200 feet of any constructed feature; at designated dispersed sites; and other dispersed sites deemed important at the time of implementation.</p> <p>Alternatively, at designated dispersed sites or other dispersed sites deemed important and at developed recreation sites (except developed campgrounds or designated recreation areas) and at administrative sites, move heavy slash to designated slash piles and burn as soon as conditions allow.</p>	LRMP
SVR-4	In developed recreation and administrative sites (typically VQOs of Modification or Maximum Modification), minimize damage from mechanical treatments to young healthy trees and understory trees and shrubs.	LRMP
SVR-5	<p>In areas of Retention or Partial Retention, minimize damage to natural features such as rock outcrops, young healthy trees and understory of trees and shrubs; cut stumps as low to the ground as feasible. Note: Retention and Partial Retention will be applied to National Recreation Trails, National Scenic Trails, National Historic Trails and State or Forest Service Scenic Byways/All-American Roads.</p> <p>If additional potential reroutes of the CDNST are identified for consideration in agency planning documents, this design feature will be applied to those potential reroutes.</p>	LRMP
SVR-6	<p>For all designated trails (NRT, NST and NHT) and scenic byways and sensitivity level 1 roads or trails, the VQO is Retention for the foreground of these areas. The VQO is Partial Retention for the middle ground of these areas. Design treatments based on the VQO.</p> <p>When cutting trees that fall across trails or within the trail corridor (generally 3 feet on either side of the trail), lop and scatter logs and limbs outside the corridor.</p> <p>Cut stumps flush with the ground in the immediate (to 300 feet) foreground of these travel ways.</p> <p>Remove heavy slash (greater than 1 foot deep) within the immediate foreground (to 300 feet) to slash piles (which will be burned or are expected to be minimally apparent within 5 years) or chip. Slash may be scattered to depths of less than 1 foot.</p> <p>Do not use these routes for skidding. Minimize skid trails across these features. Rehabilitate any skid trails or temporary roads that intersect with these features or are present in the foreground (up to ½ mile).</p>	LRMP

Identifier	Design Feature	Source / Citation
	Do not locate landings along or within the immediate foreground (to 300 feet) of these travel ways.	
SVR-7	For all treatments, revegetate and till disturbed and compacted soils on landings, burned slash pile sites, skid trails and temporary roads with native seed mixture after the completion of treatments. Block access to decommissioned or re-claimed temporary roads with naturalistic barriers.	LRMP.
<b>Silviculture</b> <b>Objectives:</b> 1. For spruce beetle-affected stands: a. Provide for salvage of dead or dying stands b. Maintenance of green stands where they exist c. Regenerate stands where needed. 2. For stands to be treated for aspen decline: a. Regeneration of aspen before advanced decline, by either fire or mechanical removal b. Increase landscape resilience of aspen by ensuring that there are significant patches of young aspen c. Provide for aspen establishment 3. Shift toward drought tolerant early seral species where appropriate.		
SV-1	All regeneration cutting will meet stocking standards as defined in the Forest Plan.	GMUG Forest Plan
SV-2	All vegetation treatments, including prescribed fire, will be prescribed by a U.S. Forest Service, Region 2, Certified Silviculturist in accordance with applicable guidance from other resource specialists.	FSH 2409.17 Silvicultural Practices handbook
SV-3	To the greatest degree practicable given site fuels conditions, jackpot and pile burning would be used as acceptable methods to assist with natural regeneration strategies and to create mineral soil seedbeds for natural regeneration. Harvested areas would be evaluated for stocking.	R-2 FSH 2409.17 Silvicultural Practices Handbook
SV-4	During site preparation or piling activities, mineral soil exposure will be less than 40% of the treated area. Soil cover should be retained when practicable.  To assist natural regeneration, conduct vegetation and fuels management activities to average 20 - 40% mineral soil exposure in post-harvest, as prescribed in the stand management prescription. On south slopes, mineral soil exposure would be less so that site moisture can better be retained.  If the area has been identified as being high risk for invasive plants, or is known to have existing infestations, reduce soil exposure and consider artificial regeneration practices (planting). Also see IW-3.	Alexander 1987
SV-5	In order to reduce the risk of beetles being drawn to uninfected trees, in stands with a component of live trees of the species of concern which are not beetle-infected, felled trees of the species of concern shall be removed from the sale area by no later than October 31 of the year following felling. Unutilized and un-merchantable material (in excess of the 10-20 tons/acre required by the Forest Plan) that is cut during operations and greater than 6" diameter at the small end could be removed from the stand and taken to the landing. This will be considered yarding of un-merchantable material (YUM). When removal of non-merchantable	Professional judgment of GMUG silviculturists and Forest Health Protection Staff.

Identifier	Design Feature	Source / Citation
	material (YUM) is operationally infeasible, material would be debarked in stands, chipped or otherwise treated within the stand to reduce the likelihood of the material being utilized as brood material. Treatment of non-merchantable material will be prescribed by a certified silviculturists, with the overall goal to reduce brood material.	
SV-6	During any types of harvest in spruce-fir, areas of advanced regeneration will avoided to the greatest degree practicable while allowing feasible operations.	Professional judgment and standard operating procedure used by GMUG silviculturists
(RG-2)	Coordinate with District Rangeland Management Specialists prior to treatment to determine whether or not grazing deferment or pasture rest is needed, when deferment or rest is needed (prior to or following treatment), and for how long.	Professional judgment of GMUG silviculturists and rangeland management specialist.

Identifier	Design Feature	Source / Citation
<b><u>Fuels/Slash Piles</u></b> <b>Objectives:</b> <ol style="list-style-type: none"> <li>1. Use current science and silvicultural, fuels and fire management practices to achieve an optimum balance between positive and negative effects of slash treatment on soils, hydrology, wildlife and potential fire risk.</li> <li>2. Reduce negative impacts of fires.</li> </ol>		
SP-2	A minimum and maximum fuel loading will be specified in association with harvests and fuels treatments. Generate associated Brush and Disposal (BD) plan. This minimum and maximum will include any needs to reduce fuels near infrastructure and leave material onsite for seedling establishment, wildlife benefit and soils health.	Standard operating procedure used by GMUG silviculturists and fuel managers.
SP-3	In Management Areas 1A, 1B and 1D, (developed recreations sites, ski areas, utility corridors ) enough harvest/activity-generated fuels will be removed so that residual fuel loading produce less than four foot flame lengths under 90% burning conditions . Slash piles will be burned by the Forest Service in accordance with agency protocols.	1991 Forest Plan Amendment, 8224GM, p III-91, III-95, III-99 and standard operating procedure used by GMUG silviculturists
SP-4	To facilitate complete burning, piles shall be compact in size and shape, and free of soil. Piles will not be less than 12 (twelve) feet in height. Piles shall not be constructed as windrows, rather the size of each pile's footprint shall be minimized. The size of each pile's footprint shall not exceed 50 feet in any dimension. Piles shall be of a size and location which will not impair road use or result in damage to residual timber. Piles shall be located at least 50 feet from residual timber.	Professional judgment and standard operating procedure used by GMUG silviculturists and fuels managers.
SP-5	In areas treated for recovery where beetle kill is prominent, piles will be burned as soon as burn conditions for pile burning occur (usually first adequate snowfall event).	Professional judgment and standard operating procedure used by GMUG silviculturist and fuels managers.
SP-6	Activity-generated fuels would be reduced in compliance with the treatment Brush and Disposal (BD) plan. The District silviculturist will coordinate with fuels personnel to develop prescriptions considering economical harvest methods, activity fuels and residual site conditions.	FSH 2409.19
SP-7	Slash piles should not be located within 2 tree lengths of the tallest residual snags, groups of snags in salvage treatments, or residual live trees. If possible this design feature should be applied to green tree treatments.	Safety requirement for firefighters burning slash piles during better dispersion (i.e., windy) conditions.

Identifier	Design Feature	Source / Citation
SP-8	Monitor a sample of pile burn scars for bare soil and— on scars located on slopes and in swales—for the presence of rills, gullyng, or soil movement. If >100 sq ft of burn scar consisting of bare soil; minor rilling or gullyng present within or adjacent to burn scar; minor deposition of soil downslope of scar, treatment bare soil and erosion according to District protocols, which may include one or two of the following: addition of mulching, scarification, inoculation with adjacent soils, seeding, etc. If monitoring reveals >200 sq ft of burn scar consisting of bare soil; multiple rills, or gullyng, or gullyng 2-3" deep within burn scar; significant deposition of soil downslope of scar, elevate treatment application. <b>(A decision-making trigger identified in Chapter 2).</b>	Professional judgment; SBEADMR-specific monitoring component
Identifier	Design Feature	Source / Citation
<b><u>Transportation System and Haul Routes</u></b> <b>Objectives:</b> Manage travel management effectively to provide resource protection and a safe, environmentally sound, and efficient transportation system.		
TSHR-1	Existing roads will be used for equipment access to the extent road location and condition permit reasonable access. Implementation of mechanical treatments and harvests will attempt to minimize road construction whenever possible.	USDA Forest Service, 2006. Conservation Practices Handbook and treatment-specific design
TSHR-2	<p>New Access Roads: Where terrain, road length, and other resource risks exist, a “Designed Road” shall be utilized for Treatment access. Designed Roads would be surveyed, designed, and administered by the Forest Service engineering department.</p> <p>Temporary roads may be used where a designed road is not needed, as determined by the Forest Service. The location and clearing widths of all Temporary Roads or facilities shall be agreed to in writing (between the Forest Service and the contractor) before construction is started.</p> <p>Following use for harvest and treatment implementation, both temporary AND designed roads will be decommissioned, which involves re-contouring where significant side slope exists, elimination of ditches and other structures, out-sloping during construction, removal of ruts and berms, effectively blocking the road to normal vehicular traffic where feasible, and construction of drainage features such as cross ditches and water bars. Invasive species monitoring will occur after road decommissioning and will be followed by weed treatments where needed. Effectiveness of road closure will also be monitored.</p>	Treatment-specific design  Timber Sale Contract Standard Provisions (Contract FS-2400-6, USDA Forest Service 2006)
TSHR-3	Require commercial haulers to perform maintenance commensurate with their use; depositing sufficient funds with the Forest Service may be used in lieu of performance. Surface rock replacement deposits will be collected to maintain currently surfaced roads that are used for timber hauling. Deposits will be collected commensurate with the use. Quarry materials will be collected from a site that has been found to be free of invasive plants.	FSM 7732.03
TSHR-4	Timber hauling operations will be restricted during wet or thawed conditions, when needed to protect the road surface. When logging occurs over snow or frozen ground, standard Forest Service practices will be followed.	USDA Forest Service, 2012. FS National BMPs; Treatment- specific design
TSHR-5	Safety signing will be used to alert the public that logging operations are in progress and would meet the requirements of the Manual of Uniform Traffic Control Devices (MUTCD).	Timber Sale Contract Standard Provisions (Contract FS-2400-6, USDA Forest Service 2006); FSM 7160
TSHR-6	Use of private roads, encroachment of public roads and rights-of-way, and other access needs outside Forest Service jurisdiction shall have the proper approval or authorization in place prior to use.	16 U.S.C. 572; treatment- specific design

Identifier	Design Feature	Source / Citation
TSHR-7	Use suitable road surface stabilization practices and dust abatement supplements on roads where road surface conditions, traffic use and proximity to recreation or public occupancy justify the need. (See FSH 7709.56 and FSH 7709.59)	USDA Forest Service, 2012.
TSHR-8	Move snow in a manner that will avoid or minimize disturbance of or damage to road surfaces and drainage structures. Use existing standard contract language (C5.316# or similar) for snow removal during winter logging operations to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources.	USDA Forest Service, 2012
TSHR-9	<p>Use the following measures to conserve water when managing roads for SBEADMR:</p> <ul style="list-style-type: none"> <li>• Locate new roads with consideration of key topographic factors important to road maintenance, including steepness of slope, position on slope, aspect and drainage pattern.</li> <li>• When possible, schedule road maintenance activities to coincide with higher moisture content for ease of grading and better compaction.</li> <li>• Minimize new road widths to provide for safe use while limiting impermeable surfaces.</li> <li>• Keep ditches open, but do not remove vegetation that does not impede drainage. Vegetation holds the soil in place and reduces sediment loading which is the greater problem.</li> <li>• When installing drainage features, return intercepted runoff to its natural path at the first opportunity.</li> <li>• To avoid clogging, keep the grade of drainage features steeper than the roadway.</li> </ul> <p>In general, avoid stream crossings. Where necessary, align the roadway to fit the stream. Avoid road capture of the channel, which can result in the stream diverting down the road – causing severe erosion. Do not constrict and accelerate flows, which can erode the channel.</p>	Zeedyk, W. Water Harvesting from Low-Standard Rural Roads. 2006.

Identifier	Design Feature	Source / Citation																		
<b><u>Water Quality and Soil Productivity</u></b> <b>Objectives:</b> <ol style="list-style-type: none"> <li>1. Manage treatments to maintain ground cover to prevent harmful increases in runoff.</li> <li>2. In the Water Influence Zone (WIZ) next to perennial &amp; intermittent streams, lakes, and wetlands, allow only those actions that maintain or improve long-term stream health and riparian ecosystem condition</li> <li>3. Design and construct all stream crossings and other in-stream structures to provide for passage of flow and sediment, withstand expected flood flows, and to allow free movement of resident aquatic life.</li> <li>4. Maintain long-term ground cover, soil structure, water budgets, and flow patterns of wetlands to sustain their ecological functions.</li> <li>5. Limit roads and other disturbed sites to the minimum feasible number, width, and total length.</li> <li>6. Construct roads and other disturbed sites to minimize sediment discharge into streams, lakes, &amp; wetlands.</li> <li>7. Stabilize and maintain roads and other disturbed sites during and after construction to control erosion.</li> <li>8. Reclaim roads, landings and other disturbed sites when use ends, as needed, to prevent resource damage.</li> <li>9. Manage land treatments to limit the sum of severely burned soil and detrimentally compacted, eroded, and displaced soil to no more than 15% of any activity area.</li> </ol> <p>The following design features to protect watershed resources are based on, and structured according to the Region 2 Watershed Conservation Practices Handbook. They address conditions or circumstances that have occurred on recent GMUG NF timber sales. Additional BMPs in the R2 Handbook or National Handbook may apply within future treatment areas as determined during treatment-specific assessments. The various measures may be achieved through avoidance, on-the-ground marking, appropriate contract provisions, identification on the sale or service area map, and/or during sale or contract administration.</p> <p>Treatment-specific soils, hydrologic, and watershed condition assessments will be performed prior to any on-site work (see Appendix C). Treatment-specific design features will be selected based on treatment tasks and the results of treatment-specific assessments.</p>																				
WQSP-1	A. Maintain the organic ground cover of each activity area so that pedestals, rills, and surface runoff from the activity area are not increased. The amount of organic ground cover needed will vary by different ecological types and should be commensurate with the potential of the site. B. Restore the organic ground cover of degraded activity areas within the next plan period, using certified local native plants as practicable; avoid persistent or invasive weeds. Also see IW-3.	USDA Forest Service 2006																		
WQSP-2	A. The minimum horizontal width of the Water Influence Zone for various water related features is as follows: <table border="1"> <thead> <tr> <th>Feature</th><th>Outside Edge of WIZ</th><th>No Harvest or Mechanical Travel Zone</th></tr> </thead> <tbody> <tr> <td>Fens and their associated wetlands</td><td>100 ft minimum from edge of fen</td><td>100 ft from edge of fen</td></tr> <tr> <td>Perennial Streams</td><td>100 ft. from stream bank</td><td>50 ft from stream bank</td></tr> <tr> <td>Intermittent Streams, Reservoirs and Ponds</td><td>50 ft. from bank or high water line</td><td>25 ft from bank or high water line</td></tr> <tr> <td>Wetlands <math>\geq \frac{1}{4}</math> acre</td><td>100 ft. from edge of wetland</td><td>50 ft from edge of wetland</td></tr> <tr> <td>Springs/Seeps/Wetlands/</td><td>50 ft. from the</td><td>25 ft from the source of edge of</td></tr> </tbody> </table>	Feature	Outside Edge of WIZ	No Harvest or Mechanical Travel Zone	Fens and their associated wetlands	100 ft minimum from edge of fen	100 ft from edge of fen	Perennial Streams	100 ft. from stream bank	50 ft from stream bank	Intermittent Streams, Reservoirs and Ponds	50 ft. from bank or high water line	25 ft from bank or high water line	Wetlands $\geq \frac{1}{4}$ acre	100 ft. from edge of wetland	50 ft from edge of wetland	Springs/Seeps/Wetlands/	50 ft. from the	25 ft from the source of edge of	USDA Forest Service 2006, Management Prescription 09A in 1991 Forest Plan, and treatment-specific design
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	<table border="1" data-bbox="310 245 1360 527"> <tr> <td data-bbox="310 245 682 386">depression recharge areas &lt; ¼ acre</td><td data-bbox="682 245 888 386">source or edge of associated wetland, whichever is greater</td><td data-bbox="888 245 1360 386">associated wetland, whichever is greater</td></tr> <tr> <td data-bbox="310 386 682 467">Ephemeral Streams and Swales</td><td data-bbox="682 386 888 467">25 ft from the channel or topographic low</td><td data-bbox="888 386 1360 467"></td></tr> <tr> <td data-bbox="310 467 682 527">Ditch</td><td data-bbox="682 467 888 527">Edge of Right of Way</td><td data-bbox="888 467 1360 527"></td></tr> </table> <p data-bbox="218 544 1444 938">           B. Keep heavy equipment out of streams, swales, and lakes, except to cross at designated points, build crossings, or do restoration work, or if protected by at least 1 foot of packed snow or 4 inches of frozen soil. Keep heavy equipment out of streams during fish spawning, incubation, and emergence periods.            C. Ensure at least one-end log suspension in the WIZ. Fell trees in a way that protects vegetation in the WIZ from damage. Keep log landings and skid trails out of the WIZ, including swales.            D. Locate new concentrated-use sites outside the WIZ if practicable and outside riparian areas and wetlands. Armor or reclaim existing sites in the WIZ to prevent detrimental soil and bank erosion.            E. Do not excavate earth material from, or store excavated earth material in, any stream, swale, lake, wetland, or WIZ.            F. Maintain at least 80 percent of potential ground cover within the WIZ            G. Burn piles may be located within the outer half of WIZs but must not cover more than 15% of the ground.            H. Avoid direct ignition of prescribed fire within WIZs. Prescribed fire may be allowed to back in to these areas.         </p>	depression recharge areas < ¼ acre	source or edge of associated wetland, whichever is greater	associated wetland, whichever is greater	Ephemeral Streams and Swales	25 ft from the channel or topographic low		Ditch	Edge of Right of Way		
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WQSP-3A	<p data-bbox="218 946 1444 1024">A. As required, obtain Corps of Engineers (COE) and State permits when installing stream crossings and ensure they meet permit requirements. In most cases, installation of stream crossing are exempt from COE or State permits as long as BMPs at 33 CFR 323.4 are followed (FSH 2509.25 Section 01.1 – Key Laws).</p> <p data-bbox="218 1024 1331 1052">B. Size culverts and bridges to pass debris. Engineers work with hydrologists and aquatic biologists on site design.</p> <p data-bbox="218 1052 1444 1182">C. Install stream crossings that will be in place for more than one season in a manner that to sustains bankfull dimensions of width, depth, and slope and keep streambeds and banks resilient. Favor bridges, bottomless arches or buried pipe-arches for those streams with identifiable flood plains and elevated road prisms, instead of pipe. Favor armored fords for those streams where vehicle traffic is either seasonal or temporary, or the ford design maintains the channel pattern, profile and dimension.</p>	USDA Forest Service 2006									
WQSP-3B	<p data-bbox="218 1195 1444 1300">Where access across the WIZ must be provided by temporary roads, they will be completely decommissioned by obliteration within 5-years of sale closure. Obliteration at crossings will include the removal of culverts &amp; fill material, the re-contouring of stream banks to the original landform shape, and seeding &amp; mulching of the disturbed surfaces. The remaining prism within the WIZ shall be de-compacted, seeded, and mulched.</p>	Management Prescription 09A, 1991 Forest Plan, and treatment-specific design									
WQSP-4	<p data-bbox="218 1308 1241 1336">A. Keep ground vehicles out of wetlands. Do not disrupt water supply or drainage patterns into wetlands.</p> <p data-bbox="218 1336 1283 1364">B. Keep roads and trails out of wetlands. Avoid actions that may dewater or reduce water budgets in wetlands.</p> <p data-bbox="218 1364 800 1391">C. Avoid any loss of rare wetlands such as fens and springs.</p> <p data-bbox="218 1391 1377 1438">D. Do not build fire lines in or around wetlands unless needed to protect life, property, or wetlands. Use hand lines with minimum feasible soil disturbance. Use wetland features as firelines if practicable.</p>	USDA Forest Service 2006, Executive Order 11990, and treatment-specific design									

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WQSP-5A	Manage land treatments to limit the sum of severely burned soil and detrimentally compacted, eroded, and displaced soil to no more than 15% of any activity area.	USDA Forest Service 2006.																																			
WQSP-5B	A. With the exception of general road grading, avoid soil-disturbing actions during periods of heavy rain or wet soils. Apply travel restrictions to protect soil and water. B. Install cross-drains to disperse runoff into filter strips and minimize connected disturbed areas. Make cuts, fills, and road surfaces strongly resistant to erosion between each stream crossing and at least the nearest cross drain. Revegetate using certified local native plants as practicable; avoid persistent or invasive weeds. C. Use existing roads unless other options will produce less long-term sediment. Reconstruct for long-term soil and drainage stability. D. Avoid ground skidding on sustained slopes steeper than 40% and on moderate to severely burned sustained slopes greater than 30%. Conduct logging to disperse runoff as practicable. E. Locate and construct log landings in such a way to minimize the amount of excavation needed and to reduce the potential for soil erosion. Design landings to have proper drainage. After use, treat landings to disperse runoff and prevent surface erosion and encourage revegetation.	USDA Forest Service 2006 and treatment-specific design																																			
WQSP-6	A. Design all roads, trails, and other soil disturbances to the minimum standard for their use and to "roll" with the terrain as feasible. B. Use filter strips, and sediment traps if needed, to keep all sand-sized sediment on the land and disconnect disturbed soil from streams, lakes, and wetlands. Disperse runoff into filter strips.	USDA Forest Service 2006 and treatment-specific design																																			
WQSP-7A	A. Do not encroach fills or introduce soil into streams, swales, lakes, or wetlands. B. Space cross drains according to road grade and soil type as indicated in WQSP – 7B. Do not divert water from one stream to another. C. Empty cross drains onto stable slopes that disperse runoff into filter strips. On soils that may gully, armor outlets to disperse runoff. Tighten cross-drain spacing so gullies are not created. D. Where berms must be used, construct and maintain them to protect the road surface, drainage features, and slope integrity while also providing user safety.	USDA Forest Service 2006 and treatment-specific design																																			
WQSP-7B	<div>A. Skid trail locations will be agreed to by the Forest Service in advance of construction; spacing will be approximately 100 feet apart, allowing for topographic variation and skid trail convergence. Space water bars as appropriate on skid trails according to slope and soil type as indicated below:<table><tr><th colspan="5">Unified Soil Classification - ASTM D 2487<sup>1</sup></th></tr><tr><th>Slope (%)</th><th>ML, SM <u>Extremely Erodible</u> Silts &amp;sands with little or no binder (i.e. decomposed granite)</th><th>MH, SC, CL <u>Highly Erodible</u> Silts &amp; sands with moderate binder</th><th>SW, SP, GM, GC <u>Moderately Erodible</u> Gravels + fines &amp; sands with little or no fines</th><th>GW, GP <u>Slightly Erodible</u> Gravels with little or no fines</th></tr><tr><td>1-3</td><td>200</td><td>300</td><td>400</td><td>500</td></tr><tr><td>4-6</td><td>125</td><td>200</td><td>300</td><td>400</td></tr><tr><td>7-9</td><td>100</td><td>150</td><td>200</td><td>250</td></tr><tr><td>10-12</td><td>70</td><td>100</td><td>150</td><td>200</td></tr><tr><td>13-25</td><td>50</td><td>50</td><td>75</td><td>100</td></tr></table></div>	Unified Soil Classification - ASTM D 2487 <sup>1</sup>					Slope (%)	ML, SM <u>Extremely Erodible</u> Silts &sands with little or no binder (i.e. decomposed granite)	MH, SC, CL <u>Highly Erodible</u> Silts & sands with moderate binder	SW, SP, GM, GC <u>Moderately Erodible</u> Gravels + fines & sands with little or no fines	GW, GP <u>Slightly Erodible</u> Gravels with little or no fines	1-3	200	300	400	500	4-6	125	200	300	400	7-9	100	150	200	250	10-12	70	100	150	200	13-25	50	50	75	100	USDA Forest Service 2006, ASTM D-2487, and treatment-specific design
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13-25	120	220	270	410																																						
WQSP-8A	<p>A. Site-prepare, drain, de-compact soils, revegetate, and close landings, main skid trails, and temporary and intermittent use roads and other disturbed sites within 5 years of the end of sale closure. Provide stable drainage that disperses runoff into filter strips and maintains stable fills. Do this work concurrently. Stockpile topsoil where practicable to be used in site restoration. Revegetate using certified local native plants as practicable; avoid persistent or invasive exotic plants.</p> <p>B. Remove all temporary stream crossings (including all fill material in the active channel), restore the channel geometry, and revegetate the channel banks using certified local native plants as practicable.</p> <p>C. Restore cuts and fills to the original slope contours where practicable and as opportunities arise to re-establish subsurface pathways. Use certified local native plants as practicable; avoid persistent or invasive weeds. Obtain storm water (402) discharge permits as required.</p>	USDA Forest Service 2006 and treatment-specific design																																								
WQSP-8B	<p>In decommissioning roads,</p> <p>A. Implement suitable measures to close and physically block the road entrance so that unauthorized motorized vehicles cannot access the road.</p> <p>B. Establish effective ground cover (i.e. erosion control measures and revegetation) on disturbed sites to avoid or minimize accelerated erosion and soil loss.</p> <p>C. Evaluate risks to soil, water quality, and riparian resources and use the most practicable, cost-effective treatment to achieve long-term desired conditions and water quality management goals and objectives.</p> <p>D. Use applicable practices of BMP Fac-2 (Facility Construction and Storm water Control) for storm water management and erosion control when obliterating designed roads.</p> <p>E. Implement suitable measures to re-establish stable slope contours and surface and subsurface hydrologic pathways where necessary to the extent practicable to avoid or minimize adverse effects to soil, water quality, and riparian resources.</p> <p>F. Remove drainage structures.</p> <p>G. Re-contour and stabilize cut slopes and fill material when needed.</p> <p>H. Reshape the channel and streambanks at crossing sites to pass expected flows without scouring or ponding, minimize potential for undercutting or slumping of streambanks, and maintain continuation of channel dimensions and longitudinal</p>	USDA Forest Service 2012																																								

Identifier	Design Feature	Source / Citation
	<p>profile through the crossing site.</p> <p>I. Restore or replace streambed materials to a particle size distribution suitable for the site.</p> <p>J. Restore floodplain function if impaired by treatment operations.</p> <p>K. Implement suitable measures to promote infiltration of runoff and intercepted flow and desired vegetation growth on the road prism and other compacted areas.</p> <p>L. Use suitable measures in compliance with local direction to prevent and control invasive weeds (also see IW-1 to IW-6)</p>	
WQSP-9A	<p>A. Restrict roads, landings, skid trails, concentrated-use sites, and similar soil disturbances to designated sites.</p> <p>B. Operate heavy equipment for land treatments only when soil moisture is below the plastic limit, or protected by at least 1 foot of packed snow or 4 inches of frozen soil.</p> <p>C. Conduct all prescribed fires to minimize the residence time on the soil while meeting the burn objectives. This is usually done when the soil and duff are moist.</p>	USDA Forest Service 2006, FSH 2509.18, Soil Management Handbook, 1992, and treatment-specific design
WQSP-9B	Fire lines and fuel breaks should utilize existing roads, skid trails, natural features, and use of wet lines as much as possible to minimize impacts caused by new line construction.	<i>Treatment-specific design</i>
WQSP-9C	The total length and width of constructed lines should be minimized. Blading to expose bare mineral soil displaces the nutrient and organic matter enriched surface horizon and increases the risk of erosion and spread of invasive weeds.	<i>Treatment-specific design</i>
WQSP-9D	Avoid dozer line construction on slopes greater than 30%.	<i>Treatment-specific design</i>
WQSP-9E	After use, pull soil and litter back into the fire line, seed, and top scatter slash if available. Where fire lines create cut slopes re-contour by pulling side cast or fill material back, seed, and top scatter slash if available immediately after use.	<i>Treatment-specific design</i>
WQSP-9F	Avoid direct ignition of concentrated areas of dry masticated materials greater than 2" in depth. Prescribed fire (broadcast burning) may be allowed to burn into these areas.	<i>Treatment-specific design</i>
WQSP-10	To ensure HUC12 disturbance is less than 25 percent, maintain disturbances from mechanical harvest treatments and roads to less than 25 percent of the HUC12 area. Other natural events (wildfire) could also affect watershed integrity. Weighted acres of mechanical harvest, road construction or other anthropogenic or natural disturbances within the watershed will be tracked in order to ensure cumulative impacts of SBEADMR, other related actions and wildfire remain below this 25% cap. If 20% of the HUC12 is affected, discontinue or reduce acres of treatment in watershed so 25% threshold not exceeded. If 25% of the watershed is affected, discontinue treatments in suitable watershed until recovery has occurred.	LRMP, Watershed Conservation Practices Handbook.
Identifier	Design Feature	Source / Citation

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<b><u>Wildlife, Fish and Rare Plants</u></b> <b>Objectives:</b> <ol style="list-style-type: none"> <li>1. Design treatments to meet applicable objectives and standards with the Southern Rockies Lynx Amendment (SRLA). Consider guidelines outlined in the SRLA in treatment planning. When guidelines cannot be met, provide rationale to Fish and Wildlife Service (FWS) in year-end reporting.</li> <li>2. Design treatments to meet applicable Forest Plan standards and guidelines related to wildlife.</li> <li>3. Complete annual reporting to FWS as required by the SRLA.</li> <li>4. Seek opportunities to integrate wildlife habitat management objectives as part of treatment activities.</li> </ol> Design treatments to meet Gunnison sage-grouse habitat objectives from the Range-wide Plan.		
WFRP-1	All applicable management Objectives, Standards and Guidelines contained in the Southern Rockies Lynx Amendment will be applied during treatment planning and implementation.	USDA Forest Service, Rocky Mountain Region, 2008. (SRLA)
WFRP-2	At a minimum, in spruce-fir forest types maintain 90 to 225 snags per 100 acres, 10 inches in diameter at breast height (dbh) or greater (where biologically feasible). In aspen forest types, maintain 120 – 180 snags per 100 acres, 8 inches dbh or greater (where biologically feasible). Snags would be maintained away from structures, roads and trails so that they do not create safety hazards to the public. Where possible, utilize natural sinuosity or drainages for linking groups. Protect standing wildlife trees from damage during site preparation and post-sale activities.	GMUG Forest Plan Standards and Guidelines
WFRP-3	Where feasible, maintain a minimum of 10-20 tons per acre of coarse woody debris within harvest units. Where possible in regeneration units, create piles of logs, stumps, or other woody debris to minimize the effects of larger openings.	GMUG Forest Plan Standards and Guidelines
WFRP-4	Maintain large diameter downed logs in various stages of decomposition within harvest units (50 linear feet/acre of 10 inches diameter or larger at the large end of lodgepole pine and aspen logs and/or 12 inches diameter or larger for Engelmann spruce, subalpine fir and Douglas fir logs).	GMUG Forest Plan Standards and Guidelines
WFRP-5	<p>Strive to maintain forested cover on 60% or more of the perimeter of all natural and created openings, and along at least 60% of each NFS Road (level 5 and below) that has high levels of human use during the time deer and elk would be expected to inhabit an area. Roads with restricted use could provide for less cover. Except where natural openings or parks exist along roads and when applying hazard tree removal activities along roads to meet public safety goals, gaps along roads should not exceed ¼ mile. Cover should be well-distributed across the landscape. Minimum sizes for hiding and thermal cover patches are 2 -5 acres for mule deer, and 30 – 60 acres for elk. Hiding and thermal cover may be the same in many cases.</p> <p>The intent is to maintain or improve habitat diversity and make or keep the area in a condition where deer and elk can effectively use the area by managing the vegetation and human activity. This design feature provides an opportunity to implement the proposed commercial and noncommercial activities in a way that accomplishes these wildlife habitat objectives while also meeting the purpose and need of the project. District wildlife, timber and fire programs will coordinate closely during the planning and design phase of projects to accomplish these objectives.</p>	Direction for maintaining habitat connectivity at the landscape scale, and to retain hiding and thermal cover for big game; GMUG Forest Plan (Page III-28, General Direction 01, Standard and Guideline a and b)
WFRP-6	Provide hiding cover within 1,000 feet of any known elk calving areas. The District wildlife biologist will be responsible for coordinating with Colorado Parks and Wildlife to identify calving areas and informing timber and fire staff on locations. When calving areas are identified, a 1,000 foot buffer will be applied and existing vegetation conditions within the buffer will be assessed by the District biologist to determine cover needs, identify areas to avoid with treatments, or coordinate with timber and fire staff to determine how treatments could be designed to maintain or enhance cover.	GMUG Forest Plan (Page III-24, General Direction 01, Standard and Guideline a)

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WFRP-7	Northern goshawk - No activities will be allowed within ½ mile of active nests from March 1 to August 31, with the exception that on roads open to other traffic, log hauling will be allowed. The timing restriction buffer could be reduced to ¼ mile if topographic features and/or adequate screening cover are present that would protect the nest site from disturbance. No harvest activities will be allowed within a 30-acre buffer of nest sites. Outside of a 30-acre area around goshawk nest sites, timing restrictions are not needed for treatment layout, marking, and any other activities that are non-disturbing (i.e., activities not involving the use of heavy equipment or chainsaws). Timing restrictions will only apply to active nests, as confirmed by the GMUG National Forests' wildlife biologist. The District wildlife biologist will keep the timber and fire staff informed on nest status and locations.	Colorado Parks and Wildlife Raptor Buffer and Timing Restriction Recommendations; GMUG Forest Plan Standards and Guidelines
WFRP-8	Northern goshawk – provide or leave 20% of pole or mature tree stands adjacent to nesting sites with at least 150 square feet of basal area. Provide or leave at least one class 1 log adjacent to nest sites. The District wildlife biologist will be responsible for coordinating with timber and fire staff on nest locations and assessing vegetation conditions adjacent to nest sites.	GMUG Forest Plan (Page III-24, General Direction 01, Standard and Guideline e)
WFRP-9	On-going surveys for raptors would be conducted to determine locations of individuals or populations of these species and allow for the implementation of protection measures using the appropriate buffer or timing restriction.	Treatment- specific design; Migratory Bird Treaty Act
WFRP-10	Retain live trees in salvage units, except for trees that need to be removed for operational/safety or silvicultural purposes. Operational/safety or silvicultural purposes include the need to remove live trees if necessary to access dead trees for salvage or to address safety concerns.	Treatment- Specific Design
WFRP-11	Skid trails and landings will be located to minimize impacts to advanced regeneration. Skid trails should be placed at least 100 feet apart, except where they converge at landings.	Treatment- Specific Design
WFRP-12	Areas in Lynx Analysis Units supporting live advanced regeneration with >35% Dense Horizontal Cover in blocks greater than 0.3 acres will be avoided to the extent possible during layout [and during harvest operations], while allowing feasible operations.	SRLA – VEG S6 Standard
WFRP-13 and WQSP-5A.	Landings and main skid trails should be evaluated to determine if detrimental soil compaction has occurred. Based on review by a specialist, when detrimental compaction is found, subsoil ripping may be applied to reduce soil impacts. When a site prep contract is necessary, this provides the opportunity to rip skid trails and landings in the area and potentially in nearby adjacent areas. This would provide for a more suitable seedbed for future regeneration, thus preventing permanent impacts of skid trails that when left in a compacted state, often do not regenerate as well as adjacent un-compacted areas. Importantly, all operations will conform to the direction in Chapter 10 of the Water Conservation Practices Handbook including managing treatments to limit the sum of severely burned soil and detrimentally compacted, eroded, and displaced soil to no more than 15% of any activity area.	Treatment- Specific Design to address impacts and recovery of snowshoe hare and lynx habitat (SRLA); Water Conservation Practices Handbook, FSH 2509.25, Chapter 10
WFRP – 14	During treatment planning appropriate TES species inventories will be completed as determined by the District Wildlife Biologist. Once a treatment is in the implementation phase, if TES species are confirmed the District wildlife biologist will be consulted and the appropriate standards for the Forest Plan will be applied (timing restrictions, buffer of nest sites, identify no cut area around nest sites, etc.). For example, if a new goshawk nest is found during operations, operations will stop; the District biologist will be informed and will evaluate the situation to determine if adverse impacts are occurring. This may include establishing an avoidance area around the occupied habitat or nest site consistent with Forest Plan direction and best available science to avoid impacts that could lead to nest abandonment and/or mortality.	Treatment- Specific Design; Endangered Species Act; Forest Service Sensitive Species Policy; Migratory Bird Treaty Act.
WFRP-15	Winter logging is encouraged to limit direct disturbance to the fewest number of wildlife species as possible. During severe winters, avoid treatment activities in areas where concentrations of big game animals occur. If there are concentrations of animals along haul routes, during severe winters minimize stress to big game animals to the extent practicable by: A. Re-routing along another acceptable route. B. From December 1 to April 15, restrict haul times to between 9 am and 4 pm, unless otherwise agreed to in writing by the	GMUG Forest Plan General Direction 04, 05c.and 05f. (page III-76 – II-77)

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	<p>Forest Service.</p> <p>The district biologist will coordinate with Colorado Parks and Wildlife to assess big game use and identify areas where animals concentrate during winter, and assess if there is a need to implement conservation measures. This would be a coordinated effort with the GMUG, Colorado Parks and Wildlife, timber purchaser, and contracting officer. When the need arises to protect concentrations of wintering big game during severe winters, the District wildlife biologist will be responsible for providing the timber staff with maps of these areas.</p>	
WFRP-17	<p>Habitat connectivity will be maintained at the landscape scale (Lynx Analysis Unit and Linkage areas for lynx) through various methods depending on treatment type, location and overall condition of each Lynx Analysis Unit. Methods may include a combination of variable retention regeneration harvest methods through resiliency treatment types; tree retention areas of various sizes and shapes to retain snag groups and protect live understory trees across the landscape, with emphasis on multi-storied forest stands and areas typically used by wildlife as travel corridors (ridges, saddles, stream corridors); protection of water influence zones and stringers of timber; and maintaining areas of high quality snowshoe hare habitat as determined from dense horizontal cover field surveys using an established scientific protocol (cover board protocol). In terms of habitat connectivity considerations and to meet the Southern Rockies Lynx Amendment direction, there will be a lot of focus on protecting areas with high quality dense horizontal cover in multi-storied stands and managing vegetation at the landscape-scale toward Potential Natural Vegetation (PNV). On a timber sale by timber sale basis, coordination will occur between the District wildlife biologist and the timber staff to determine the appropriate method for accomplishing habitat connectivity goals, including determining the appropriate size, shape, and location of tree retention areas.”</p>	<p>Treatment- specific design intended to support consistency with SRLA direction for lynx habitat connectivity.</p> <p>Interagency Lynx Biology Team, 2013.</p>
WFRP – 18	<p>To maintain the amount and distribution of lynx foraging habitat over time capable of supporting lynx at the LAU scale, manage so that no more than 30% of the lynx habitat in an LAU is in an early stand initiation structural stage or has been silviculturally treated to remove horizontal cover (i.e., does not provide winter snowshoe hare habitat). Emphasize sustaining snowshoe hare habitat in an LAU. If more than 30% of the lynx habitat in an LAU is in early stand initiation structural stage or has been silviculturally treated to remove horizontal cover (e.g., clear-cuts, seed tree harvest, pre-commercial thinning, or understory removal), no further increase as a result of vegetation management treatments should occur on federal lands. Acres affected by lynx analysis unit through 2015 are available in the treatment analysis file. As management occurs in the affected LAU over the life of the treatment, acres affected will be tracked by the District wildlife biologist and Forest wildlife program lead to ensure consistency with this conservation measure.</p>	SRLA; Interagency Lynx Biology Team. 2013
WFRP-19	<p>American (Pine) Marten – Research has shown that martens avoid openings created from vegetation management activities that completely remove all trees (structural stand initiation stage) if the openings are larger than 300 feet in width. In areas identified as multi-storied spruce-fir, openings created should be less than 300 feet in width unless suitable marten habitat is maintained within cutting units through snag, advanced regeneration, and coarse woody debris retention as described in the above design features. Cutting units of this size will only occur when salvage prescription are applied and will be subject to WFRP-12.</p> <p><b>Exception:</b> areas where public safety is a concern (road corridors, around structures, etc.). Commercial treatments will target dead trees larger than eight inches in diameter so some residual cover will remain within cutting units. Irregular-shaped harvest units are desirable.</p>	GMUG Forest Plan (Page III-24, General Direction 01, Standard and Guideline b)
WFRP-20	<p>Within secondary habitat for lynx (300 foot buffer from primary habitat) retain spruce and fir in aspen-spruce mix stands. Primary habitat is defined as having a dominance of spruce-fir cover type. Most of the secondary habitat includes either pure aspen or aspen-spruce mixed stands.</p>	USDA Forest Service, 2008 -Southern Rockies Lynx Amendment.
WFRP-22	<p>When planning treatments in mature aspen, complete inventories for purple martin and avoid these areas if birds are detected. In Colorado, habitat preference seems very specific: edges of mature aspen stands, usually near a stream, spring or pond</p>	Colorado Breeding Bird Atlas, 1998.

Identifier	Design Feature	Source / Citation
WFRP-23	In LAU with extensive mortality of mid-late and late seral spruce (Habitat Structural Stages 4A, 4B and 4C), retain these live stands to the greatest extent practicable during treatment design.	SRLA
WFRP – 24	To minimize spread of Amphibian Chytrid Fungus, at least one member of the Aquatics Team will participate in the planning and implementation of project-level operations. See also IW-2 for equipment washing requirements.	Johnson & Speare, 2003; Johnson et al., 2003
WFRP – 25	In areas where Boreal Toad is known to exist, the timing of ground-based activities may be limited by the season. Boreal Toads forage up to 1.6 miles from breeding sites (pond) between July and late October. Ground-based operations of commercial or non-commercial equipment may be limited in these areas to when there is at least 4 inches of frozen soil or snow to the extent practicable. Under current known toad distribution, WFRP-25 would only apply to the Cement Creek commercial PTA.	Bartelt et al. 2004
WFRP – 26	Where non-commercial fuel reduction treatments could overlap with occurrence of Boreal Toad, there will be no mechanical operations (i.e. mastication, etc.). In these areas pile burning will be used to reduce fuels while concurrently minimizing ground disturbance, the possibility of indirect toad mortality and reduction or loss of hibernaculum habitat. Under current known toad distribution, WFRP-25 would only apply to the Buzzard Creek non-commercial PTA.	Bartelt et al. 2004



